

AUD 657990

REPORT NUMBER 159

JUNE 1965

FINAL DESIGN WEIGHT REPORT

LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM

CONTRACT NUMBER DA44-177-TC-715

GENERAL  ELECTRIC

Report Number 159

Final Design Weight Report

XV-5A Lift Fan

Flight Research Aircraft Program
Contract DA 44-177-TC-715

June 1965

ADVANCED ENGINE AND TECHNOLOGY DEPARTMENT
GENERAL ELECTRIC COMPANY
CINCINNATI, OHIO 45215

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1.0 INTRODUCTION

This is the actual weights report for the U.S. Army XV-5A Lift Fan Flight Research Aircraft. The report is submitted as supplementary information for Contract No. DA44-177-TC-715 and is representative of both aircraft Serial Numbers 62-4505 and 62-4506.

The XV-5A was designed to evaluate the flight characteristics of the lift fan propulsion system and to demonstrate capability of the system with a high subsonic aircraft. The aircraft has an aspect ratio 3.4 mid-wing and provides side-by-side seating for pilot and observer. The total propulsion system consists of the General Electric X353-5B propulsion unit made up of two J-85-5 turbojet engines, two wing fans, and two exhaust gas flow diverter valves. The General Electric X376 pitch fan is installed at the nose of the aircraft. The general arrangement and three-view of the aircraft are shown in Figures 1 and 2.

The report contains weight and balance data in summary and in detail. The summary data is given for several fuel and flight test instrumentation combinations considered compatible with the Flight Test Program. Performance requirements were written for endurance missions of 20 to 45 minutes and therefore weights data are given for the aircraft with fuel to perform these missions with flight test instrumentation included. The design gross weight of the aircraft is 9200 lbs., and therefore data is given for this weight.

The Weight Empty given herein includes only those items required by Aircraft Specification. It does not, for instance, include the auxiliary fuel tank nor instrumentation or other temporary items installed for initial flight test purposes only.

Horizontal distances used in this report are measured from fuselage station zero. Vertical distances are measured from a theoretical plane 100 inches below the fuselage horizontal reference plane.

XV-5A GENERAL ARRANGEMENT

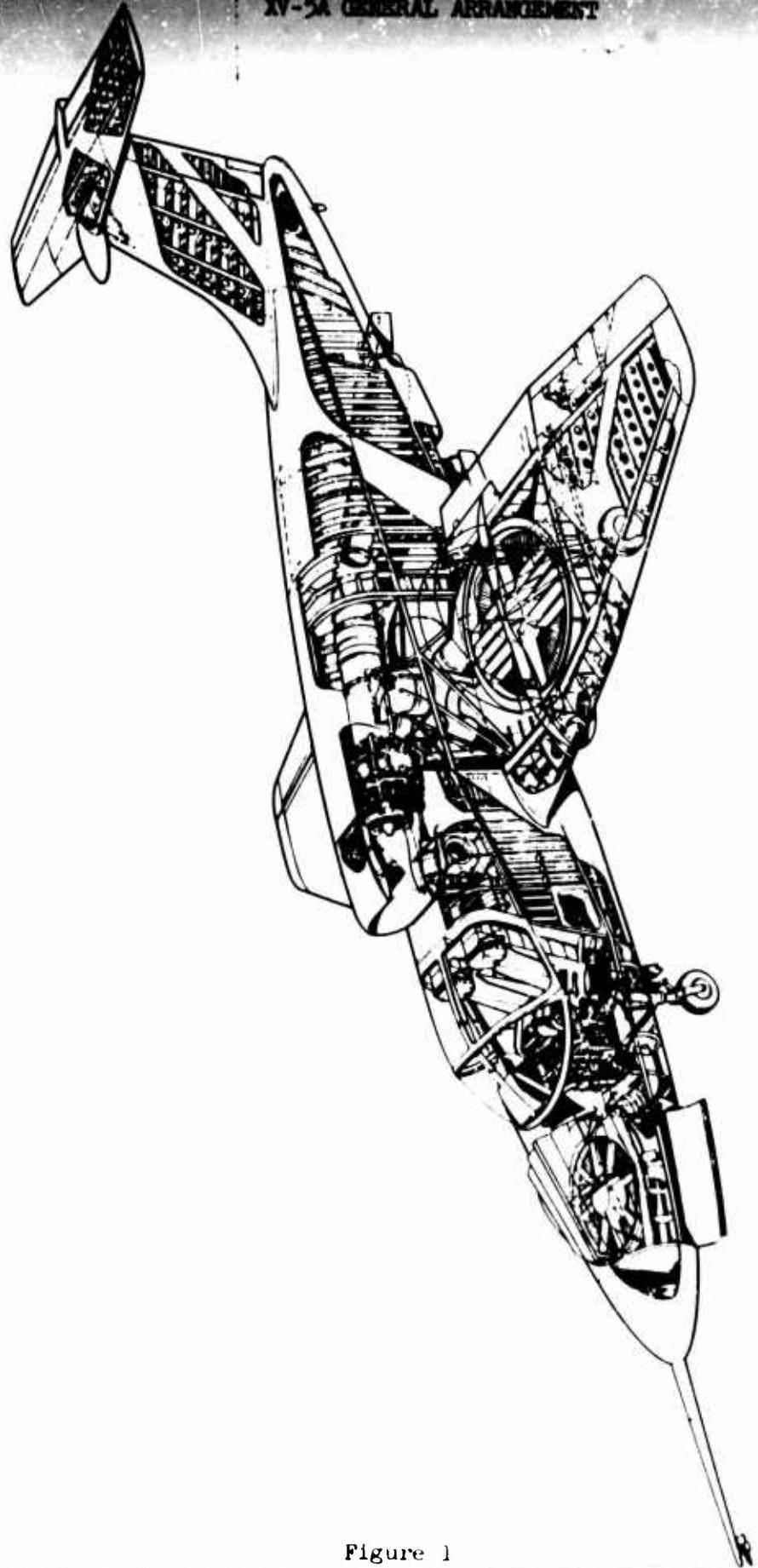
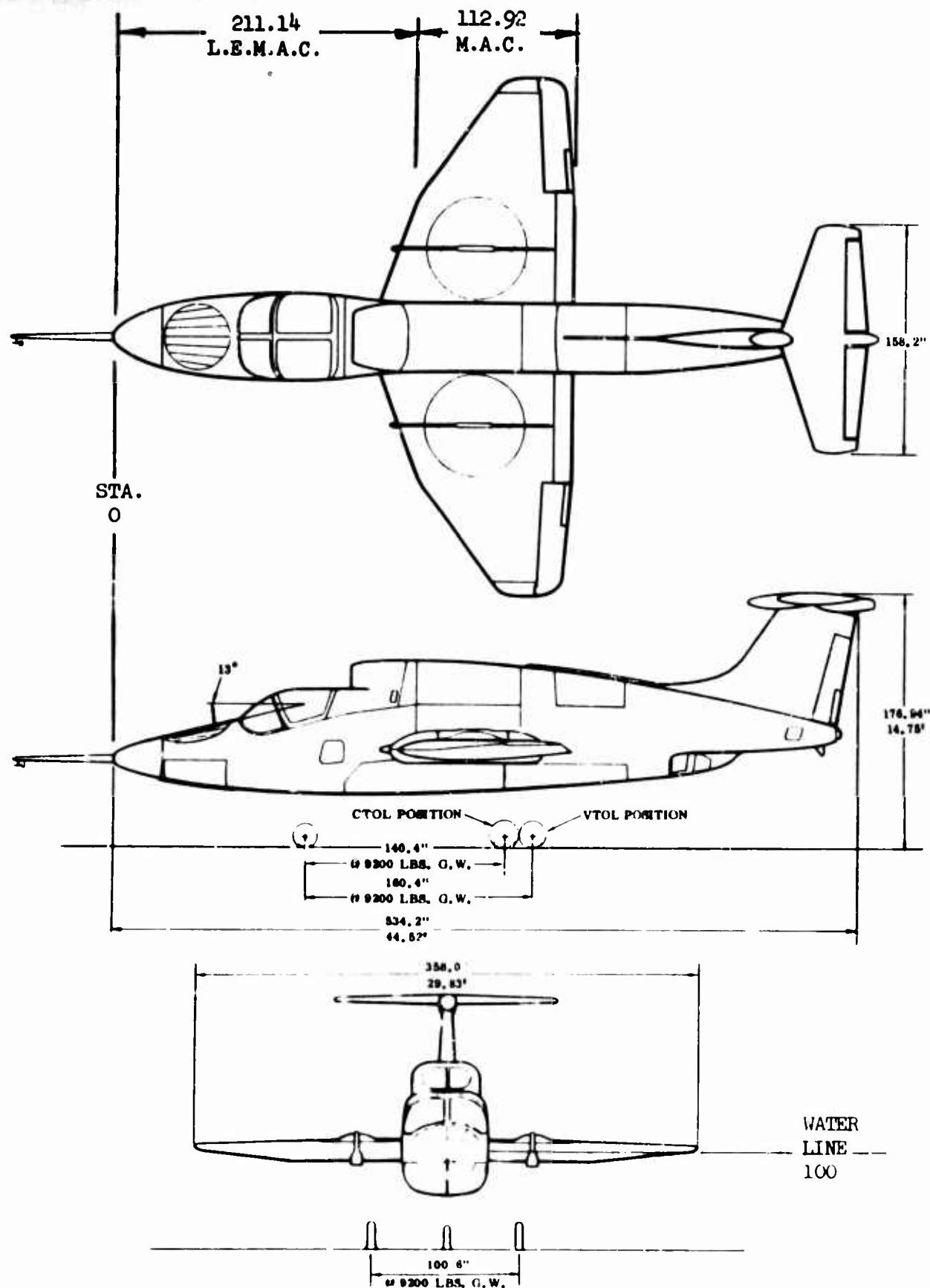


Figure 1

2.0 WEIGHT AND BALANCE

2.1 Weight and Center of Gravity Summary

XV-5A THREE VIEW



Figure

SUMMARY - WEIGHT AND CENTER OF GRAVITY

CONFIGURATION	WEIGHT	HORIZONTAL		VERTICAL		% MAC
		ARM	MOMENT	ARM	MOMENT	
WEIGHT EMPTY - Gear Up	8063	248.4	2002587	113	911119	33.0
*GROSS WEIGHT CONDITIONS						
20 Minute Mission	9972	240.7	2397591	111	1113255	26.2
45 Minute Mission	10873	241.6	2624332	112	1223417	27.0
Design Gross Weight - 9200 Lbs.	9200	240.8	2213102	111	1030401	26.3
Design Gross Weight - 9200 Lbs. (Less Instrumentation)	9200	245.0	2251346	111	1032896	30.0
Full Fuel - Incl. Aux. Tank	12095	244.2	2951725	113	1383611	29.3
Extended Range (Less Instrumentation)	12500	246.0	3073429	111	1403248	30.9

*Note: All conditions include 515 lbs. of standard instrumentation equipment unless otherwise noted.

All conditions are with the landing gear retracted.

Forward Center of Gravity Limit - Sta. 240, 25.56% MAC

Aft Center of Gravity Limit - Sta. 246, 30.87% MAC

2.2 Group Weight Statement

U.S. ARMY

XV-5A

LIFT-FAN FLIGHT RESEARCH AIRCRAFT

GROUP WEIGHT STATEMENT

- ACTUAL

-CROSS OUT THOSE NOT APPLICABLE-

CONTRACT DA44-177-TC-715

AIRPLANE-GOVERNMENT NUMBER 62-4505 and 62-4506

AIRPLANE-CONTRACTOR NUMBER

MANUFACTURED BY RYAN AERONAUTICAL COMPANY

ENGINE

MAIN

ARMED

MANUFACTURED BY

GENERAL ELECTRIC

GENERAL ELECTRIC

MODEL

J85-GE-5B

X353-5B

NUMBER

2

2

PROPELLER

MAIN

ARMED

MANUFACTURED BY

MODEL

NUMBER

AN 9103-D-TAI
NAME
DATE

GROUP WEIGHT STATEMENT
WEIGHT EMPTY

PAGE 11
MODEL XV-5A
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1	WING GROUP					1059.27
2	CENTER SECTION-BASIC STRUCTURE				423.12	
3	INTERMEDIATE PANEL-BASIC STRUCTURE					
4	OUTER PANEL-BASIC STRUCTURE - INCL TIPS	4.12	LBS	144.08		
5						
6	SECONDARY STRUCTURE - INCL WINGFOLD MECH		LBS	353.84		
7	AILERONS - INCL BALANCE WEIGHT		LBS	31.69		
8	FLAPS-TRAILING EDGE			75.54		
9	-LEADING EDGE					
10	SLATS					
11	SPOILERS					
12	SPEEDBRAKES					
13						
14						
15	TAIL GROUP					267.07
16	STABILIZER-BASIC STRUCTURE			103.76		
17	FINS-BASIC STRUCTURE-INCL DORSAL	3.15	LBS	81.91		
18	SECONDARY STRUCTURE-STABILIZER	INS (5.00 Vert. & 3.87 Horiz.)		8.87		
19	ELEVATOR - INCL BALANCE WEIGHT	17.56	LBS	40.10		
20	RUDDERS - INCL BALANCE WEIGHT	12.21	LBS	32.43		
21						
22						
23	BODY GROUP					1340.69
24	FUSELAGE OR HULL-BASIC STRUCTURE			798.91		
25	BOOMS-BASIC STRUCTURE					
26	SECONDARY STRUCTURE-FUSELAGE OR HULL			157.65		
27	-BOOMS					
28	-SPEEDBRAKES					
29	-DOORS, PANELS & MISC			384.13		
30						
31	ALIGHTING GEAR GROUP-LAND	- TYPE				481.85
32	LOCATION	*ROLLING STRUCT CONTROLS				
33		ASSEMBLY				
34	MAIN	80.98	259.23	60.35	399.56	
35	NOSE	20.17	55.31	6.81	82.29	
36						
37						
38						
39	ALIGHTING GEAR GROUP-WATER					
40	LOCATION	FLOATS	STRUTS	CONTROLS		
41						
42						
43						
44						
45	SURFACE CONTROLS GROUP					440.20
46	COCKPIT CONTROLS				24.45	
47	AUTOMATIC STABILIZATION SYSTEM				40.72	
48	SYSTEM CONTROLS - INCL POWER & FEEL CONT		LBS	137.15		
49	VERTICAL TAKE-OFF CONTROLS			237.88		
50	ENGINE SECTION OR NACELLE GROUP					44.55
51	INBOARD					
52	CENTER				11.55	
53	OUTBOARD					
54	DOORS, PANELS & MISC					
55						
56	PAGE TOTAL				3633.63	
57						

* WHEELS, BRAKES, TIRES, TUBES AND AIR

AN 9103-D-TAB
NAME _____
DATE _____

GROUP WEIGHT STATEMENT
WEIGHT EMPTY

PAGE 13
MODEL _____
REPORT 64B148

1	PROPELLER GROUP	LIFT	PITCH		3676.34
2		X FAN	FAN	MAIN	X
3	ENGINE INSTALLATION	1773.80	116.42		935.90
4	AFTERBURNERS-IF FURN SEPARATELY				28.24
5	ACCESSORY GEAR BOXES & DRIVES				
6	SUPERCHARGER FOR TURBO TYPES				
7	AIR INDUCTION SYSTEM	131.94	136.39		63.01
8	EXHAUST SYSTEM		84.37		220.47
9	COOLING SYSTEM				10.30
10	LUBRICATING SYSTEM				
11	TANKS				
12	COOLING INSTALLATION				
13	DUCTS, PLUMBING, ETC				
14	FUEL SYSTEM				
15	TANKS-PROTECTED				53.42
16	-UNPROTECTED				70.97
17	PLUMBING, ETC				
18	WATER INJECTION SYSTEM				
19	ENGINE CONTROLS				42.90
20	STARTING SYSTEM				8.21
21	PROPELLER INSTALLATION				
22					
23	SUB TOTAL-PROPELLER	1905.74	337.18		1433.42
24	AUXILIARY POWER PLANT GROUP				
25	INSTRUMENTS & NAVIGATIONAL EQUIPMENT GROUP				73.08
26	HYDRAULIC & PNEUMATIC GROUP				115.43
27					
28					
29	ELECTRICAL GROUP				195.57
30	AC SYSTEM				5.82
31	DC SYSTEM				189.75
32	ELECTRONICS GROUP				39.64
33	EQUIPMENT				38.02
34	INSTALLATION				1.62
35					
36	ARMAMENT GROUP - INCL GUN/TIRE PROTECTION			LBS	
37	FURNISHINGS & EQUIPMENT GROUP				212.95
38	ACCOMMODATIONS FOR PERSONNEL				166.52
39	MISCELLANEOUS EQUIPMENT				12.06
40	FURNISHINGS				
41	EMERGENCY EQUIPMENT				34.37
42					
43	AIR CONDITIONING & ANTI-ICING EQUIPMENT GROUP				34.27
44	AIR CONDITIONING				33.15
45	ANTI-ICING				1.12
46					
47	PHOTOGRAPHIC GROUP				
48	AUXILIARY GEAR GROUP				27.39
49	HANDLING GEAR				.66
50	ARRESTING GEAR				26.73
51	CATAPULTING GEAR				
52	ATO GEAR				
53					
54	MANUFACTURING VARIATION				
55	UNACCOUNTABLE				64.70
56	PAGE TOTAL				
57	TOTAL-WEIGHT EMPTY - PG 2-3				8063.00

AM 9103-D-TAB
NAME _____
DATE _____

GROUP WEIGHT STATEMENT
USEFUL LOAD & GROSS WEIGHT

PAGE 15
MODEL XV-5A
REPORT 64B148

LOAD CONDITION			20 MIN.	45 MIN.	FULL	EXTENDED
			MISSION	MISSION	FUEL	RANGE
SCREW - NO. (1)			200	200	200	200
4 PASSENGERS - NO.						
5 TWIN						
6 INTERNAL	TYPE	GALS				
7 INTERNAL	JP-4		26	26	36	49
8 INTERNAL - AUXILIARY	JP-4		1132	2033	2430	2430
9 INTERNAL - EXT. RANGE					780	780
10 INTERNAL						787
11						
12 BOMB BAY						
13						
14 OIL						
15 TRAPPED			3	3	3	3
16 ENGINE			12	12	12	12
17						
18 FUEL TANKS-LOCATION					35	155
19 WATER INJECT. FLUID	GALS					
20						
21 BAGGAGE						
22 CARGO						
23						
24 ARMAMENT						
25 GUNS-LOCATION FIX/FLEX QUANTITY CALIBER						
26						
27						
28						
29						
30						
31						
32 AMMUNITION						
33						
34						
35						
36						
37						
38						
39						
40						
41						
42						
43						
44						
45						
46 EQUIPMENT						
47 PYROTECHNICS						
48 PHOTOGRAPHIC						
49						
50 OXYGEN						
51						
52 MISCELLANEOUS						
53 INSTRUMENTATION			515	515	515	
54						
55 USEFUL LOAD			1909	2810	4032	4437
56 WEIGHT EMPTY			8063	8063	8063	8063
57 GROSS WEIGHTS - PG 2-4			9972	10873	12095	12500

* IF NOT SPECIFIED AS WEIGHT EMPTY

AN 9103-D-TAB
NAME
DATE

GROUP WEIGHT STATEMENT
DIMENSIONAL & STRUCTURAL DATA

PAGE 17
MODEL
REPORT 64B148

	LENGTH-OVERALL-FT	50.48 (Incl. Nose Boom)	WEIGHT-OVERALL STATIC-FT	14.75
MAIN	AUX	BOOMS	FUS X	NACELLES
1	FLOATS	FLOATS	OR HULL INBOARD	CENTER OUTBOARD
2 LENGTH-MAX-FT			42.92	
3 DEPTH-MAX-FT			7.66	
4 WIDTH-MAX-FT			5.00	
5 WETTED AREA-SQ FT (1216 TOTAL AIRPLANE)			627.00	
6 FLOAT/HULL DISPL MAX LBS				
7 FUSELAGE VOLUME-CU FT	PRESSURIZED	NONE	TOTAL	735.0
8			WING	H TAIL V TAIL
9 GROSS AREA-SQ FT (HORIZ. STAB.=40.80, VERT. STAB.=44.60)			260.32	52.86 51.00
10 WEIGHT/GROSS AREA-#/SQ FT			4.07	2.37 1.94
11 SPAN-FT			29.83	13.18 7.75 Approx.
12 ELEVATORS				12.00
13 RUDDER				6.40
14 SWEEPBACK-AT 25% CHORD LINE-DEGREES			15.0 & 28.3	13.70 30.00
15 -AT % CHORD LINE-DEGREES				
16 THEORETICAL ROOT CHORD LENGTH-INCHES			145.00	65.64 103.92
17 -MAX THICKNESS-INCHES			15.30	7.88 17.15
18 CHORD AT PLANFORM BREAK-LENGTH-INCHES			109.00	
19 -MAX THICKNESS-INCHES			14.38	
20 THEORETICAL TIP CHORD LENGTH-INCHES			43.00	30.60 54.00
21 -MAX THICKNESS-INCHES			5.16	3.67 7.02
22 DORSAL AREA, INCL IN FUS - HULL - V TAIL-AREA-SQ FT				2.40
23 TAIL LENGTH-25% M.A.C. WING TO 25% M.A.C. H TAIL-FT			22..	
24 AREA-SQ FT/AIRPLANE FLAPS L.E.			T.E.	25.37
25 LATERAL CONTROLS SLATS	SPOILERS			AILERONS
26 SPEED BRAKES WING	FUSE/HULL			20.11
27				
28				
29				
30				
31 LIGHTING GEAR	LOCATION		MAIN	NOSB
32 LENGTH-OLEO EXT-C.L. AXLE TO C.L. TRUNNION-INCHES			65.00	38.35
33 OLEO TRAVEL-FULL EXT TO COLLAPSED-INCHES			9.20	8.0
34 FLOAT OR SKI STRUT LENGTH-INCHES				
35 ARRESTING HOOK LENGTH-C.L. HOOK TRUNNION TO C.L. HOOK POINT-INCHES				
36 HYDRAULIC SYSTEM CAPACITY-GALS	4.5			
37 FUEL & LUB SYST	NUMBER # GALS		NUMBER # GALS	
38 LOCATION TANKS PROTECTED			TANKS UNPROTECTED	
39 FUEL-INTERNAL WING				
40 -EXTERNAL FUS/HULL			494	
41 -BOMB BAY				
42				
43				
44 OIL				
45				
46 STRUCTURAL DATA-CONDITION	WING		STRESS	ULT L.D.
47 FUEL-GALS			GROSS WT	
48 FLIGHT			9200	6.0
49 LANDING			9200	6.0
50 MAX GROSS WT WITH ZERO WING FUEL			9200	6.0
51 CATAVULTING				
52 MINIMUM FLYING WEIGHT			7693	6.0
53 LIMIT AIRPLANE LANDING SINKING SPEED-FT/SEC			9200	10.0
54 WING LIFT ASSUMED FOR LANDING DESIGN CONDITION-#W				
55 STALL SPEED-LANDING CONFIGURATION-POWER OFF-KNOTS				
56 PRESSURIZED CABIN-ULT DESIGN PRESSURE DIFFERENTIAL-FLIGHT P.S.I.				NONE
57 AIRFRAME WEIGHT-AS DEFINED IN AN-W-21 -LBS				

* LBS OF SEA WATER @ 64 LBS/CU FT
** PARALLEL TO 6 AT CENTERLINE AIRPL

*** PARALLEL TO CENTERLINE AIRPL
**** TOTAL USABLE CAPACITY

RYAN

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WEIGHT AND BALANCE REPORT
XV-5A

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2.3 Detail Weight Statement

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PAGE 21
MODEL
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U.S. ARMY		
XV-5A		
LIFT-FAN FLIGHT RESEARCH AIRCRAFT		
DETAIL WEIGHT STATEMENT		
- ACTUAL		
-CROSS OUT THOSE NOT APPLICABLE-		
CONTRACT DA44-177-TC-715		
AIRPLANE-GOVERNMENT NUMBER 62-4505 & 62-4506		
AIRPLANE-CONTRACTOR NUMBER ..		
MANUFACTURED BY RYAN AERONAUTICAL COMPANY		
ENGINE	MAIN	LIFT-FAN
MANUFACTURED BY	GENERAL ELECTRIC	GENERAL ELECTRIC
MODEL	J85-GE-5B	X353-5B
NUMBER	2	2
PROPELLER	MAIN	AUXILIARY
MANUFACTURED BY		
MODEL		
NUMBER		

AN 9102-D-TAB
NAME
DATE

WING GROUP
BASIC STRUCTURE

PAGE 23
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1	2	3	CENTER SECTION	INTERM PANEL	OUTER PANEL
4	UPPER-FRONT SPAR CAP				
5	-INTERMEDIATE SPAR CAP				
6	-REAR SPAR CAP				
7	-AUXILIARY SPAR CAP				
8	-INTERSPAR COVER			17.29	56.04
9	-SPANWISE STIFFENERS				
10	-JOINTS, SPLICES & FAST.			8.81	
11	-BRACKETS-SKIN-SUPPORTED			5.18	
12					
13					
14	LOWER-FRONT SPAR CAP				
15	-INTERMEDIATE SPAR CAP				
16	-REAR SPAR CAP				
17	-AUXILIARY SPAR CAP				
18	-INTERSPAR COVER			25.07	
19	-SPANWISE STIFFENERS				
20	-JOINTS, SPLICES & FAST.			4.44	
21	BRACKETS-SKIN SUPPORTING			6.90	
22	FRONT SPAR			94.34	14.79
23	REAR SPAR			88.50	13.55
24	SPAR WEB & STIFF.-FRONT				
25	-INTERMEDIATE				
26	-REAR				
27	-AUXILIARY				
28	-JOINTS, SPLICES & FAST.				
29	DOUBLERS-SKIN				3.90
30					
31	INTERSPAR-RIBS			4.42	29.82
32	-BULKHEADS			23.09	
33	-CHORDWISE STIFFENERS				
34	-JOINTS, SPLICES & FAST.			5.83	1.77
35	FAN RING			25.95	
36	LEADING EDGE-COVER			36.00	10.50
37	-STIFFENERS				
38	-RIBS			22.09	2.48
39	-AUXILIARY SPARS				
40	-JOINTS, SPLICES & FAST.			5.28	1.20
41					
42					
43	TAILING EDGE-COVER			16.95	3.48
44	-STIFFENERS				
45	-RIBS			3.75	1.27
46	-AUXILIARY SPARS			1.58	
47	-JOINTS, SPLICES & FAST.			1.32	.11
48	-STRIPS				.12
49					
50	TIPS				.11
51	-				
52	FIREWALL-STRUCTURAL				
53	ATTACH FTGS.-WING TO FUS.			26.13	
54					
55	COLUMN TOTALS			423.12	144.00
56	TOTAL-BASIC STRUCTURE				507.00
57					

AN 9102-D-TAB

NAME
DATEWING GROUP
SECONDARY STRUCTURE
DOORS, PANELS AND MISCELLANEOUSPAGE 25
MODEL REPORT 6-148

1	** *	X	XX	OPERATING MECHANISM		
2	L Q P AREA	STRUCT	MECH & POWER ACTUATOR	LOCK	EMERG	
3	SQ FT		CONTROLS TRANS	MECH		
4						
5	WING FOLD					
6						
7						
8	DOORS & FRAMES					
9	-LANDING					
10						
11	-BOMBS					
12						
13						
14	-GUN					
15						
16	-AMMUNITION					
17						
18	-ROCKET					
19						
20	-LIFE RAFT					
21						
22	-ESCAPE					
23						
24	-ACCESS	15.88				
25						
26	-FAN	C.S.-H-56.5	126.50	27.16	17.47	68.41
27						19.97
28	PANELS-NON STRUCTURAL					
29						
30	SEAL - FAN		16.30			
31						
32	SEAL - TE TO FLAP		1.64			
33						
34	INSULATION - EXTERNAL		29.59			
35						
36						
37						
38						
39						
40						
41						
42						
43						
44						
45						
46						
47						
48						
49	WALKWAYS, STEPS & GRIDS					
50						
51	FAIRING AND FILLETS		30.86			
52						
53	EXTERIOR FINISH					
54						
55	COLUMN TOTALS		220.83	27.16	17.47	68.41
56	TOTAL-SECONDARY STRUCTURE					19.97
57						353.84

* TYPE OF POWER- H-HYD, E-ELEC, P-PNEU, POWER TRANSMISSION FROM MAIN
 DISTRIBUTION POINT TO ACTUATING UNIT 03
 ** INDICATE LOCATION OF MAJOR DOORS- CS, OP, IP, ETC

AN 9102-D-TAB
NAME _____
DATE _____

WING GROUP
CONTROL SURFACES

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MODEL _____
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	X	AILERONS	XX	T.O. FLAPS	XX	L.O. FLAPS	X
		INBOARD	OUTBOARD	INBOARD	OUTBOARD	INBOARD	OUTBOARD
1 SPARS				5.60	8.95		
2 STRINGERS					1.48		
3 RIBS				8.81	14.00		
4							
5 COVER AND STIFFENERS				9.77	34.35		
6							
7 T.O. STRIPS				.42	1.80		
8							
9 FABRIC AND DOPE							
10							
11 TIPS				1.80			
12							
13 TABS - STRUCTURE				8.11			
14 TABS - BALANCE WEIGHTS				5.00			
15							
16 TONGUE TUBES							
17							
18 BALANCE WEIGHTS & SUPPORTS							
19							
20 AERODYNAMIC SEALS				1.66			
21							
22 CONTROL HORNS							
23 ACTUATOR ATTACH. STRUCT.					2.48		
24							
25 ACCESS DOORS-NON STRUCT				.69			
26							
27 HINGES AND PINS				1.38	7.23		
28 EXTERIOR FINISH							
29 TOTALS-SURFACE							
30							
31 CONTROL SURFACE SUPPORTS							
32 HINGES				14.12	4.85		
33 BRACKETS				4.33	1.40		
34 TRACKS							
35 CARRIAGES							
36							
37							
38							
39							
40							
41							
42							
43							
44 TOTALS-SUPPORTS							
45 COLUMN TOTALS				61.69	76.54		
46 PAGE TOTAL						138.23	
47 TOTAL WING GROUP						1059.27	

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NAME
DATE

TAIL GROUP
BASIC STRUCTURE

PAGE 29
MODEL REPORT 64B148

	X STABILIZER XX	PINS
	CENTER OUTER CENTER OUTER	DORSAL
1		
2		
3		
4	UPPER-FRONT SPAR CAP	
5	-INTERMEDIATE SPAR CAP	
6	-REAR SPAR CAP	
7	-AUXILIARY SPAR CAP	
8	-INTERSPAR COVER	20.64
9	-SPANWISE STIFFENERS	
10	-JOINTS, SPLICES & FAST.	.63
11		
12	FRAMES	.88
13		
14	LOWER-FRONT SPAR CAP	
15	-INTERMEDIATE SPAR CAP	
16	-REAR SPAR CAP	
17	-AUXILIARY SPAR CAP	
18	-INTERSPAR COVER	
19	-SPANWISE STIFFENERS	
20	-JOINTS, SPLICES & FAST.	
21	FRONT SPAR	2.73
22	CENTER SPAR	8.43
23	REAR SPAR	3.44
24	SPAR WEB & STIFF. -FRONT	
25	-INTERMEDIATE	
26	-REAR	
27	-AUXILIARY	
28	-JOINTS, SPLICES & FAST.	
29		
30		
31	INTERSPAR-RIBS	15.10
32	-BULKHEADS	
33	-CHORDWISE STIFFENERS	
34	-JOINTS, SPLICES & FAST.	2.15
35		
36	LEADING EDGE-COVER	6.24
37	-STIFFENERS	
38	-RIBS	2.48
39	-AUXILIARY SPARS	
40	-JOINTS, SPLICES & FAST.	
41		
42		
43	TRAILING EDGE-COVER	
44	-STIFFENERS	.05
45	-RIBS	.66
46	-AUXILIARY SPARS	
47	-JOINTS, SPLICES & FAST.	
48		
49	FAIRING	35.90
50	TIPS	4.26
51	ACTUATOR FITTING	.29
52	MISCELLANEOUS	
53	PIVOT FITTING	1.39
54	EXTERIOR FINISH	
55	COLUMN TOTALS	103.76
56	TOTAL-BASIC STRUCTURE	78.76
57		3.15
		185.67

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NAME
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TAIL GROUP
SECONDARY STRUCTURE
DOORS, PANELS AND MISCELLANEOUS

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1	2	3	4	5	6	7	8
1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64
65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96
97	98	99	100	101	102	103	104
105	106	107	108	109	110	111	112
113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128
129	130	131	132	133	134	135	136
137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152
153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168
169	170	171	172	173	174	175	176
177	178	179	180	181	182	183	184
186	187	188	189	190	191	192	193
194	195	196	197	198	199	200	201
203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218
219	220	221	222	223	224	225	226
227	228	229	230	231	232		

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TAIL GROUP
CONTROL SURFACES

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	X	XX	RUBBERS
	ELEVATOR	CENTER	OUTER
1			
2			
3			
4 SPARS	2.14	4.33	
5			
6			
7			
8 RIBS	2.44	1.83	
9 RIB ATTACH ANGLES		.11	
10			
11			
12 COVER AND STIFFENERS	8.70	4.02	
13			
14			
15 T.E. STRIPS	.60	.24	
16			
17 FABRIC AND DOPE			
18			
19			
20			
21 TABS		1.88	
22			
23			
24			
25 TORQUE TUBES	3.15	3.48	
26			
27			
28			
29 BALANCE WEIGHTS & SUPPORTS	17.56	12.21	
30			
31 AEROHYDRAULIC SEALS	1.23	.84	
32			
33			
34 CONTROL HORNS			
35			
36			
37 ACCESS DOORS-MON STRUCT	.38	.53	
38			
39 HINGES AND PINS	1.78	.96	
40 EXTERIOR FINISH			
41			
42 TOTALS-SURFACE			
43			
44 CONTROL SURFACE SUPPORTS			
45 HINGES	2.12	.69	
46 BRACKETS		.77	
47		.32	
48			
49			
50			
51			
52			
53			
54 TOTALS-SUPPORTS			
55 COLUMN TOTALS	40.10	32.43	
56 PAGE TOTAL			72.53
57 TOTAL-TAIL GROUP - PG 6-8			267.07

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BODY GROUP
BASIC STRUCTURE

PAGE
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1	X	FUSELAGE OR HULL	XX BOOMS
2			
3	STATION		
4	BULKHEADS & FRAMES		
5	FRONT HINGE FRAME	3.92	
6	REAR HINGE FRAME	12.40	
7			
8	FRAME - STA. 91	12.49	
9	BULKHEAD - STA. 214	47.13	
10	CANTED BULKHEAD - STA. 146	27.76	
11	BULKHEAD - STA. 165.2	14.46	
12	FRAME - ENGINE SUPT. 214	13.63	
13	BULKHEAD - M.L.G. DRAG STRUT	20.25	
14			
15	BULKHEAD - M.L.G. STA. 287	20.06	
16	BULKHEAD - WING SPAR - 296	39.49	
17			
18			
19			
20	BULKHEAD - STAB FRONT SPAR	5.12	
21	- STAB CTR SPAR	6.30	
22	- STAB REAR SPAR	3.44	
23	TRUSS STRUCTURE	114.03	
24	MINOR FRAMES	98.64	
25	JOINTS, SPLICES, FASTENERS	19.51	
26	OVERTURN STRUCTURE		
27	VERTICAL STIFFENERS	2.55	
28	COVER-UPPER BETWEEN LONGN	25.33	
29	-SIDE BETWEEN LONGERONS	50.31	
30	-LOWER BETWEEN LONGERONS	21.43	
31	HORIZONTAL STIFFENERS	4.51	
32	COVER LONGL STIFF.-UPPER		
33	-SIDE	6.99	
34	-LOWER		
35	WING L.E. ATTACH FTGS.	.78	
36	DRAG ANGLE - FUS. TO FIN	4.99	
37	LONGERONS-UPPER	36.55	
38	LONGERONS-LOWER	40.43	
39	LONGERON - UPPER EXTERNAL	8.04	
40	HORIZ. SHEAR WEBS	65.05	
41	LONGITUDINAL PARTITIONS		
42			
43	FLOORING AND SUPPORTS	21.21	
44	NOSE WHEEL WELL	12.89	
45	MAIN GEAR DOOR SUPPORT	21.18	
46			
47	FIREWALL-STRUCTURAL		
48	PITCH FAN MOUNT STRUCTURE	15.63	
49	KEELSONS	1.32	
50	KEEL		
51	MISCELLANEOUS	1.09	
52	CHINE AND SPRAY STRIPS		
53	STEP ASSEMBLY		
54	STAIRWAYS-STRUCTURAL		
55	COLUMN TOTALS	798.91	
56	TOTAL-BASIC STRUCTURE		798.91
57			

* LIST ALL MAIN & WATERTIGHT BULKHEADS & FRAMES INDIVIDUALLY. MINOR FRAMES MAY BE COMBINED.

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BODY GROUP
SECONDARY STRUCTURE

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1	X	FUSELAGE OR HULL	XX	XX
2			BOOMS	SPEED BRAKES
3				
4	ENCLOSURE-EXCL TURRET ENC			
5	CANOPY	63.13		
6	CANOPY-OPERATING MECH			
7	-RAILS			
8	-CYLINDERS & PLUMBING			
9	-FLUID			
10	-HINGE STRUCTURE	4.25		
11	-LATCH STRUCTURE	.78		
12				
13	GUNNER-TAIL			
14				
15	BOMBARDIER			
16	SIGHTING BLISTERS			
17				
18	WINDSHLD-EXCL BULLET PROT	53.94		
19				
20	WINDOWS, PORTS-INCL FRAMES			
21				
22	HEAT SHIELDING - INTERNAL	8.85		
23				
24				
25				
26				
27				
28	FLOORING AND SUPPORTS			
29				
30				
31	STAIRWAYS & LADDERS-FIXED			
32				
33	JACK PAD PROVISIONS	1.07		
34	STERNPOST AND FITTINGS			
35	NOSE BUMPER-HULL			
36	RUBBING STRIPS			
37				
38	NOSE CONE	14.85		
39				
40	TAIL CONE	9.16		
41	TAIL BUMPER	1.62		
42				
43	SPEED BRAKES-STRUCTURE			
44	-SUPPORTS			
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55	COLUMN TOTALS	157.65		
56	PAGE TOTAL			157.65
57				

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.

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BODY GROUP
SECONDARY STRUCTURE
DOORS, PANELS AND MISCELLANEOUS

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1	** *	X	XX	OPERATING MECHANISM		
2	LO P AREA	STRUCT	MECH & CONTROLS	POWER ACTUATOR TRANS	LOCK	ENERG MECH
3	SQ FT					
DOORS & FRAMES						
4	-LANDING - NOSE F-H-	5.66	7.31	4.00		
5	-LANDING - MAIN F-H-	28.1	66.40	5.89	3.71	55.85
6						
7						
8						
9						
10	-BOMB					
11						
12						
13	-GUN					
14						
15	-AMMUNITION					
16						
17	-ROCKET					
18						
19	-LIFE RAFT					
20						
21	-ESCAPE					
22						
23						
24	-WATERTIGHT					
25						
26	-COMPARTMENT					
27						
28	-ENTRANCE					
29						
30						
31	-ACCESS		29.97			
32	-ACCESS - STA. 100 to 133		7.36			
33	-SPIN CHUTE		2.31			
34	ACCESS - ELECT. COMPT.		7.02			
35	-ENGINE					
36						
37	-CAMERA					
38						
PANELS-NON STRUCTURAL						
40	-ENGINE ACCESS		47.54			
41	-SIDE .14 to 287		30.30			
42	-LOWER 105 to 376		52.88			
43						
44	-M.L.G. WHEEL WELL		3.39			
45	-COVER MECH. MIXER		2.11			
46	-SEAL FUS. TO CANOE		2.69			
47	-CLOSURE - PITCH FAN		2.81			
48						
WALKWAYS, STEPS & GRIPS						
50	FAIRING - TAILPIPE EXIT		19.88			
FAIRING AND FILLETS						
52	EXTERIOR FINISH		2.29			
53	EXHAUST DEFLECTOR PLATE		1.70			
54	INSULATION - EXTERNAL		28.40			
55	COLUMN TOTALS		354.68	9.84	3.71	55.85
56	PAGE TOTAL					384.13
57	TOTAL-BODY GROUP - PG 9-11					1340.59

* TYPE OF POWER- H-HYD, E-ELEC, P-PNEU. POWER TRANSMISSION FROM MAIN
DISTRIBUTION POINT TO ACTUATING UNIT

** INDICATE LOCATION OF MAJOR DOORS- B-BOOM, F-FUSELAGE, H-HULL.

✓ MECHANICAL LINKAGE TO GEAR

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ALIGHTING GEAR GROUP

PAGE
MODEL
REPORT

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1	TYPE	MAIN	NOSE
2			
3	LOCATION		
4			
5	QUANTITY		
6	WHEELS	28.90	9.22
7	TIRES	23.70	10.95
8	STUBERS		
9	AIR		
10	BRAKES	28.38	
11			
12			
13	ANTI-SKID DEVICE		
14			
15	FLOATS-BULKHEADS		
16	-FRAMES		
17	-COVER		
18	-COVER STIFF.-LONGL		
19	-KEELSONS		
20	-KEEL		
21	-LONGITUDINAL PARTITIONS		
22	-CHINE, SPRAY STRIP		
23	-STEP ASSEMBLY		
24	-POST ASSEMBLY		
25	-NOSE BUMPER		
26	INSPECTION DOORS		
27	WALKWAYS		
28	EXTERIOR FINISH		
29	SKIDS OR BUMPERS		
30	SKIS		
31			
32	TOTALS-RUNNING GEAR	(80.98)	(20.17)
33	SHOCK STRUT-OIL-DAMPER		44.23
34	STRUTS-DRAG	30.83	7.14
35	-SIDE	10.10	
36	-VEE BRACE	15.09	
37	PYLON		
38	SHOCK STRUT-STRUT	79.1.	
39	-STRUT OIL	3.40	
40	-FORK		
41	-AXLE		
42	-TORQUE ARMS	5.66	
43	-TRUNNIONS		
44	SHIMMY DAMPER OR SNUBBER		
45	TWO POSITION LINKAGE	29.43	
46	FITTINGS-MAIN ATTACH-WING		
47	-TAIL		
48	-BODY	45.58	3.94
49	-NACELLE		
50			
51	FAIRING		
52	GROUND FEELER PROBE	.62	
53	INSULATION	31.23	
54	PINS, BOLTS, NUTS, ETC	1.15	
55	COLUMN TOTALS	339.21	75.48
56	PAGE TOTAL		414.69
57			

TIRE SIZE: MAIN 20 x 4.4 NOSE: 18 x 4.4

RRK ENERGY FT#/1000/AIRPL 2,800 NORMAL

3,900 RTO

BRAKE TYPE: SINGLE DISK

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ALIGHTING GEAR GROUP
CONTROLS
MAIN GEAR

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LOCATION	X	BRAKE RETRACT	EMERG OPER	XX	EMERG RETRACT	EMERG EXTEN	TWO POSITION- ING CON- TROLS
2							
3							
4							
5							
6	MECHANICAL OPERATING MECH						
7	CONTROLS			2.40			
8	ACTUATORS						
9							
10							
11							
12	ELECTRICAL OPERATING MECH						
13	CONTROLS		1.04				
14	CIRCUITRY		4.13		.24		1.13
15	OPERATING MOTORS						
16	MECHANISM						
17							
18							
19							
20	HYDRAULIC OPERATING MECH						
21	CONTROLS						
22	PLUMBING	3.97	6.84				.45
23	SELECTOR VALVES	1.36					1.34
24	SEQUENCE VALVES	.68					
25	ACCUMULATORS						
26	ACTUATORS	7.06					7.40
27	MECHANISM						
28	FLUID	.04	.24				.08
29							
30							
31	PNEUMATIC OPERATING MECH						
32	CONTROLS				1.65		
33	PLUMBING				3.50		
34	PUMPS						
35	BOTTLES-AIR						
36	ACTUATORS						
37	MECHANISM						
38	UPLATCH OPER. MECH.						
39	ACTUATOR		.27				
40	MECHANISM AND PLUMBING		8.03				
41	LOCKING MECHANISM						
42	BRACES						
43	LINKS						
44	PARKING BRAKE CONTROL						
45	POSITION INDICATING MECH		2.10				
46							
47							
48	SUPTS, GUIDES, ETC-WING						
49	-TAIL						
50	-BODY		.17	1.30	.03		.1
51	-NACELLE						
52							
53							
54							
55	COLUMN TOTALS		4.10	10.72	2.84		20.78
56	PAGE TOTAL						20.78
57							

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.

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ALIGHTING GEAR GROUP
CONTROLS
CONTD
NOSE GEAR

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LOCATION	X	XX	BRAKE	ENERG	ENERG
2					
3			STEERING RETRACT	OPER	EXTEN
4					
5					
6					
7					
8					
9					
10					
11					
12	ELECTRICAL OPERATING MECH				
13	CONTROLS				
14*	CIRCUITRY		.77		.26
15	OPERATING MOTORS				
16	MECHANISM				
17					
18					
19					
20	HYDRAULIC OPERATING MECH				
21	CONTROLS				
22*	PLUMBING	2.81			
23	PUMPS				
24	RESERVOIRS				
25	ACCUMULATORS				
26	ACTUATORS	2.18			
27	MECHANISM				
28*	FLUID	.10			
29					
30					
31	PNEUMATIC OPERATING MECH				
32	CONTROLS				
33*	PLUMBING			.28	
34	PUMPS				
35	BOTTLES-AIR				
36	ACTUATORS				
37	MECHANISM				
38					
39					
40					
41	LOCKING MECHANISM				
42	BRACES				
43	LINKS				
44	PARKING BRAKE CONTROL				
45	POSITION INDICATING MECH		.32		
46					
47					
48	SUPPS, GUIDES, ETC-WING				
49	-TAIL				
50	-BODY	.09			
51	-NACELLE				
52					
53					
54					
55	COLUMN TOTALS		1.17		.50
56	PAGE TOTAL				6.81
57	TOTAL-ALIGHTING GEAR GROUP - PG 12-14				481.85

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.

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SURFACE CONTROLS GROUP COCKPIT AND AUTOPILOT

**PAGE
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		COCKPIT CONTROLS	AUTO-PILOT
1			
2			
3			
4	CONTROL COLUMN OR STICK		
5	-PILOT	3.67	
6	-ASSISTANT PILOT		
7	-CONNECTING MEMBERS	6.79	
8	-SUPPORTS		
9			
10			
11			
12			
13	RUDDER PEDALS & BRK TREAD		
14	-PILOT	6.44	
15	-ASSISTANT PILOT		
16	-CONNECTING MEMBERS		
17	-SUPPORTS	.57	
18	-ADJUSTING MECHANISM	1.35	
19	LIFT STICK	5.25	
20	LIFT STICK MECHANISM	.38	
21			
22			
23	INTEGRAL PARKING LOCK		
24	CONTROL STICK		
25	RUDDER PEDALS		
26	SURFACES		
27			
28			
29			
30			
31			
32			
33	AUTOPilot-TYPE-		
34	CONTROLLER		
35	TRANSMITTER		
36	SERVO AMPLIFIER		
37	SERVO MOTORS		
38	GYROS		
39			
40	AUTO STABILIZATION SYSTEM		
41	CONTROLLER		
42	ELECTRICAL CIRCUITRY		
43			
44			
45			
46	SUPPORTS AND BRACKETS		
47			
48	PLUMBING		
49	FLUID		
50	ELEC PANELS & CIRCUITRY		
51	PULLEYS, SPROCKETS, ETC		
52			
53			
54			
55	COLUMN TOTALS	24.45	.0.72
56	TOTAL-COCKPIT CONTROLS & AUTOPilot		55.17
57			

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.

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SURFACE CONTROLS GROUP
SYSTEM CONTROLS

PAGE +9
MODEL
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CONVENTIONAL

1	2	3	4	T _c E _a	HORIZONTAL SPEED
5	6	7	8	FLAPS	STABILIZER BRAKES
9	MECHANICAL OPERATING MECH	18.88	5.25	3.42	
10	CONTROLS		7.61	6.74	
11	TENSION REGULATORS		4.20	4.12	
12	ACTUATORS				
13	TRIM CONTROLS				
14	ELECTRICAL OPERATING MECH				
15	TYPE				
16	CONTROLS				
17	CIRCUITRY	.40		.75	2.81 6.21
18	OPERATING MOTORS				11.72
19	MECHANISM				
20	TRIM CONTROLS	1.58		1.57	1.75
21	HYDRAULIC OPERATING MECH				
22	TYPE	"B"			"P"
23	CONTROLS				
24	PLUMBING	5.37			14.89
25	PUMPS				
26	RESERVOIRS				
27	ACCUMULATORS				
28	ACTUATORS	6.30			14.47
29	MECHANISM				
30	TRIM CONTROLS				
31	FLUID	.39			1.03
32	PNEUMATIC OPERATING MECH				
33	TYPE				
34	CONTROLS				
35	PLUMBING				
36	PUMPS				
37	BOTTLES-AIR				
38	ACTUATORS				
39	MECHANISM				
40	TRIM CONTROLS				
41	ARTIFICIAL FEEL				
42	BUNGEE				
43	BOB WEIGHT				
44	AILERON DROOP SYSTEM				
45	MECHANICAL COMPONENTS	3.37			
46	ELECTRICAL ACTUATOR	1.00			
47	CIRCUITRY	.32			
48	SUPPORTS, GUIDES, ETC-WING	2.73			
49	-TAIL				.40
50	-BODY	.73	4.07	2.94	1.17 .12
51	-NACELLE				
52					
53					
54					
55	COLUMN TOTALS	41.31	21.13	19.54	15.70 59.47
56	PAGE TOTAL				137.15
57					

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.
** TYPE- ADD P-POWERED OR B-BOOST.

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SURFACE CONTROLS GROUP
SYSTEM CONTROLS
CONTD
VTOL

PAGE
MODEL
REPORT

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c4B148

1	PITCH	YAW	ROLL	LIFT	COMMON
2					
3					
4					
5	MECHANICAL OPERATING MECH	13.41	1.26	.40	13.38
6	CONTROLS				34.5*
7	TENSION REGULATORS				
8	ACTUATORS				
9	TRIM CONTROLS				
10					
11	ELECTRICAL OPERATING MECH				
12**	TYPE				
13	CONTROLS	2.70			
14*	CIRCUITRY	.63	.32	.26	.58
15	OPERATING MOTORS				8.20
16	MECHANISM				2.71
17	TRIM CONTROLS	.81	.97	.86	
18	CIRCUITRY-INTERLOCK				14.68
19	HYDRAULIC OPERATING MECH				
20**	TYPE				
21	CONTROLS				
22*	PLUMBING	5.91			8.36
23	PUMPS				
24	RESERVOIRS				
25	ACCUMULATORS				
26	ACTUATORS	9.60			53.56
27	MECHANISM				
28	TRIM CONTROLS				
29*	FLUID	.81			.87
30					
31	PNEUMATIC OPERATING MECH				
32**	TYPE				
33	CONTROLS				
34*	PLUMBING				
35	PUMPS				
36	BOTTLES-AIR				
37	ACTUATORS				
38	MECHANISM				
39	TRIM CONTROLS				
40					
41	ARTIFICIAL FEEL				
42	BUNGEE				
43	BOB WEIGHT				
44	ELECTRICAL MIXER				
45					
46					
47					
48	SUPPORTS, GUIDES, ETC-WING				31.65
49	-TAIL				
50	-BODY				.36
51	-NACELLE				...
52					
53					
54					
55	COLUMN TOTALS	15.14	1.22	1.11	126.6
56	PAGE TOTAL				
57	TOTAL-SURFACE CONTROLS GROUP - PG 13-17				440..

* FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.

** TYPE - ACC. D-POWERED OR D-POWER

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ENGINE SECTION
OR
NACELLE GROUP

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1	INBOARD	CENTER	OUTBOARD
2			
3			
4 ENGINE MOUNT			14.34
5			
6 SUPPORT BAY			
7 VIBRATION ABSORBERS			
8			
9			
10 NACELLE STRUCTURE			
11 BULKHEADS AND FRAMES			
12 COVER AND STIFFENERS			
13 FITTINGS			
14 LONGERONS			
15 ATTACHING ANGLES, ETC			
16			
17			
18			
19 PYLON AND STRUTS			
20			
21			
22			
23 *FIREWALL			30.21
24			
25 FIRE PROTECTION SHROUDS			
26			
27 COWLING			
28 ENGINE COWL			
29			
30			
31			
32			
33			
34			
35 BAFFLES			
36 ACCESSORY COWL OR SKIRT			
37 COWL FLAPS			
38 COWL FLAP CONT & MECH			
39			
40			
41			
42			
43			
44			
45 FAIRING-NAC TO WING-PYLON			
46 STEPS AND GRIPS			
47 WORKING PLATFORMS-BUILT IN			
48 INTERNAL WALKWAYS			
49			
50			
51 INSTALLATION HARDWARE			
52			
53			
54			
55 COLUMN TOTALS			44.55
56 PAGE TOTAL			44.55
57			

* IF IN NACELLE OR NON STRUCTURAL IN WING OR BODY

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DATE

PROPELLION GROUP
MAIN
GAS GENERATOR

PAGE 55
MODEL REPORT 64-P1-8

		ENGINE GEAR BOX SUPER- INSTL & DRIVES	AIR CHARGER	EXHAUST INDUCT.	COOLING SYSTEM
1					
2					
3					
4	ENGINE INSTALLATION				
5	ENGINE & DIVERTER VALVE	935.90			
6	AFTERRBURNER				
7	ENGINE AND AFTERRBURNER				
8	REDUCTION GEAR BOX				
9	EXTENSION DRIVE SHAFT				
10					
11	ACCESS. GEAR BOX & DRIVES	19.60			
12	DRIVE SHAFT	8.64			
13	SUPERCHARGER-FOR TURBOS				
14	LUBRICATING SYSTEM				
15	SUPPORTS				
16	CONTROLS				
17	PIPING-EXH TO SUPCHGR				
18					
19	AIR INDUCTION SYSTEM				
20	INTERCOOLERS & SUPPORTS				
21	AIR DUCTS AND SHROUDING			60.08	
22	INTAKE DOORS & CONTROLS				
23	AIR FILTERS				
24	SCREENS AND CONTROLS				
25	COMPRESSOR BLEED DUCT			2.93	
26					
27					
28	EXHAUST SYSTEM				
29	EXHAUST STACKS				
30	EXHAUST COLLECTORS				
31	COLLECTOR OR ENG SHROUD				
32	TAILPIPE			148.93	
33	TAILPIPE SHROUD & INSUL			58.23	
34	TAIL CONE				
35	SILENCING DEVICES				
36	SUPPORTS, BRACKETS, ETC			.30	
37	THRUST SPOILER DOORS			7.57	
38	THRUST SPOILER LINKAGE			5.44	
39	COOLING SYSTEM				
40	RADIATOR AND SUPPORTS				
41	SHUTTERS, SCOOPS, DUCTS				
42	EXPANSION TANK & SUPTS				
43	LIQ IN SYSTEM- GAL				
44	PIPING, VENTS, CLAMPS, ETC				
45	EJECTOR				10.30
46					
47	FANS				
48	CONTRAVANES				
49	FAN DRIVES				
50	CONTROLS & OPER MECH				
51					
52					
53					
54					
55	COLUMN TOTALS	935.90	.8.14	63.01	220.47 10.30
56	PAGE TOTAL				1257.92
57					

* AS INSTALLED WEIGHT

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PROPULSION GROUP

THAI

LIFT FAN

PAGE
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1		ENGINE GEAR BOX SUPER-	AIR	EXHAUST COOLING
2		INSTL & DRIVES CHARGER INDUCT.	SYSTEM	SYSTEM
3				
4	ENGINE INSTALLATION	.		
5	FAN X353-5B (2)	1765.74		
6	AFTERSURNER			
7	ENGINE AND AFTERSURNER			
8	REDUCTION GEAR BOX			
9	EXTENSION DRIVE SHAFT			
10	FAN MOUNTS	8.06		
11	ACCESS, GEAR BOX & DRIVES			
12				
13	SUPERCHARGER-FOR TURBOS			
14	LUBRICATING SYSTEM			
15	SUPPORTS			
16	CONTROLS			
17	PIPING-EXH TO SUPCHGR			
18				
19	AIR INDUCTION SYSTEM			
20	INTERCOOLERS & SUPPORTS			
21	AIR DUCTS AND SHROUDING		100.28	
22	INTAKE DOORS & CONTROLS			
23	AIR FILTERS			
24	SCREENS AND CONTROLS			
25	INSULATION		16.63	
26	DUCT SUPPORTS		15.03	
27				
28	EXHAUST SYSTEM			
29	EXHAUST STACKS			
30	EXHAUST COLLECTORS			
31	COLLECTOR OR ENG SHROUD			
32	TAILPIPE			
33	TAILPIPE SHROUD & INSUL			
34	TAIL CONE			
35	SILENCING DEVICES			
36	SUPPORTS, BRACKETS, ETC			
37				
38				
39	COOLING SYSTEM			
40	RADIATOR AND SUPPORTS			
41	SHUTTERS, SCOOPS, DUCTS			
42	EXPANSION TANK & SUPTS			
43	LIQ IN SYSTEM- GAL			
44	PIPING, VENTS, CLAMPS, ETC			
45	EJECTOR			
46				
47	PAMS			
48	CONTRAVANES			
49	PAM DRIVES			
50	CONTROLS & OPER MECH			
51				
52				
53				
54				
55	COLUMN TOTALS	1773.80		131.94
56	PAGE TOTAL			1905.74
57				

* AS INSTALLED WEIGHT

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**PROPELLION GROUP
AUXILIARY**

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PITCH FAN

	ENGINE INSTL	GEAR BOX & DRIVES	SUPER- CHARGER	AIR INDUCT.	EXHAUST SYSTEM	COOLING SYSTEM
1						
2						
3						
4	ENGINE INSTALLATION					
5*	FAN - X376 (1)		114.15			
6	AFTERSURGER					
7*	ENGINE AND AFTERSURGER					
8	REDUCTION GEAR BOX					
9	EXTENSION DRIVE SHAFT					
10	FAN SUPPORTS		2.27			
11	ACCESS, GEAR BOX & DRIVES					
12						
13	SUPERCHARGER-FOR TURBOS					
14	LUBRICATING SYSTEM					
15	SUPPORTS					
16	CONTROLS					
17	PIPING-EXH TO SUPCHGR					
18						
19	AIR INDUCTION SYSTEM					
20	INTERCOOLERS & SUPPORTS					
21	AIR DUCTS AND SHROUDING				61.54	
22	INTAKE LOUVRES				18.59	
23	AIR FILTERS					
24	SCREENS AND CONTROLS					
25	DUCT SHROUDING				30.12	
26	DUCT SUPPORTS				5.74	
27	BELLMOUTH				20.40	
28	EXHAUST SYSTEM					
29	EXHAUST STACKS					
30	EXHAUST COLLECTORS					
31	COLLECTOR OR ENG SHROUD					
32	TAILPIPE					
33	TAILPIPE SHROUD & INSUL					
34	TAIL CONE					
35	SILENCING DEVICES					
36	SUPPORTS, BRACKETS, ETC					
37	PITCH THRUST REVERSER				75.57	
38	THRUST REVERSER LINKAGE				8.80	
39	COOLING SYSTEM					
40	RADIATOR AND SUPPORTS					
41	SHUTTERS, SCOOPS, DUCTS					
42	EXPANSION TANK & SUPTS					
43	LIQ IN SYSTEM- GAL					
44	PIPING, VENTS, CLAMPS, ETC					
45						
46						
47	FANS					
48	CONTRAVANES					
49	FAN DRIVES					
50	CONTROLS & OPER MECH					
51						
52						
53						
54						
55	COLUMN TOTALS	116.42		136.39	84.37	
56	PAGE TOTAL					337.18
57						

* AS INSTALLED WEIGHT

** FOR ACTUATING MECHANISM & CONTROLS SEE
PAGE 17 "VTOL CONTROLS"

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PROPELLION GROUP
LUBRICATING AND FUEL SYSTEMS

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MODEL _____
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		X	AUXILIARY	XX	MAIN	X
		LUBRI-	CATING	FUEL	LUBRI-	FUEL
1						
2						
3	VOL-EA					
4	TYPE LOC QTY GAL					
5	TANKS					
6	BLADDER - FWD.FUS. 1	246				18.88
7	METAL - AFT FUS. 1	128				34.54
8						
9						
10						
11	AUXILIARY TANK - AFT FUS.					
12	METAL - AFT FUS. 1	120				
13	NOT INCL. IN WT. EMPTY					
14						
15						
16						
17						
18						
19						
20	INTEG TANK SEALS & SEALANT					
21	BACKING BOARD					8.85
22	TANK SUPPORTS AND PADDING				2.19	2.80
23	TANK BAY SEALING					
24						
25	TANK RELEASE AND CONTROLS					
26	OIL COOLING INSTALLATION					
27*	COOLERS AND SUPPORTS					
28	DUCTS AND SHUTTERS					
29	AUTO OIL TEMP VALVE					
30	SHUTTER CONTROLS					
31						
32	FUEL VAPOR RECOVERY					
33						
34	OIL DILUTION SYSTEM					
35						
36	VAPOR INERTION-CYL & SUPT					
37	-GENERATOR					
38	-CONTROLS					
39	PUMP INSTALLATION QTY					
40	ENGINE DRIVEN					
41	BOOSTER					14.22
42	HAND-INCL CONTROLS					
43	TRANSFER					
44	FUEL VALVE POSITION IND.					.20
45						
46	FILLING SYSTEM-GROUND					4.33
47	-IN FLIGHT					
48	ENGINE DRAIN SYSTEM					10.10
49	DISTRIBUTION SYSTEM					20.59
50	TRANSFER SYSTEM					
51	VENT SYSTEM					5.85
52	PRESSURIZATION SYSTEM					
53	DUMP SYSTEM					
54	WARNING SYST. - LOW PRESSURE					1.84
55	COLUMN TOTALS				2.19	122.20
56	PAGE TOTAL					124.39
57						

* OIL COOLER-QTY

• SIZE •

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PROPELLION GROUP
MAIN

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MODEL
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1		WATER	ENGINE STARTING	PROP
2		INJECT	CONTROLS	SYSTEM INSTL
3				
4	WATER INJECTION SYSTEM			
5	TANKS			
6	PUMPS			
7	METERING UNIT			
8	VALVES AND PLUMBING			
9	CONTROLS			
10				
11				
12	ENGINE CONTROLS			
13	IGNITION		.68	
14	THROTTLE		19.74	
15	DIVERTER VALVE		13.92	
16	***SUPERCHARGER			
17	AFTERRURNER			
18	THRUST SPOILER		8.57	
19				
20	STARTING SYSTEM - AIR IMPINGEMENT			8.21
21	POWER UNIT-TYPE			
22	STARTER-TYPE			
23	STARTER CONTROLS			
24	CRANK AND EXTENSION			
25	PRIMER AND PIPING			
26	MESHING SOLENOID			
27	CIRCUITRY			
28				
29				
30				
31				
32	PROPELLER INSTL-DIA			
33	PROPELLER-QTY			
34	CUFFS			
35	SPINNER			
36	CONTROLS-TYPE	GFAE		
37	SPEED			
38	PITCH			
39	FEATHER			
40	REVERSE			
41				
42				
43				
44				
45				
46				
47	***OIL	GAL		
48	***TANK AND PLUMBING			
49				
50				
51				
52				
53				
54				
55	COLUMN TOTALS		42.90	8.21
56	PAGE TOTAL			51.11
57	TOTAL PROPELLION GROUP			3617.65

* WATER TANKS-QTY , GAL PER TANK

** WHEN SEPARATE OIL SYSTEM IS USED.

***SUPERCHARGER INTEGRAL WITH ENGINE.

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INSTRUMENT AND NAVIGATIONAL
EQUIPMENT GROUP
INSTRUMENTS

PAGE 65
MODEL 64B148
REPORT

			X INSTR	POWER SYSTEM
1			TRANSM	
2	FUNCTIONAL GROUPS	QTY	INDIC	6 AMPL INSTL
3	AND ITEMS			
4	ACCELEROMETER		.06	
5	MACHMETER		1.65	.39
6	ALTIMETER		1.31	
7	ATTITUDE		2.86	.21
8	AIR SPEED - LOW SPEED		.00	
9				
10				
11	TURN AND BANK		1.20	.11
12	FLAP-THRUST SPOIL. POSITION		.47	1.64
13	STANDBY COMPASS		.7	.71
14	LANDING GEAR POSITION		.32	1.43
15	FUEL QUANTITY		1.82	3.77
16	FUEL FLOW		1.40	4.90
17	OIL PRESSURE - DUAL		.63	2.70
18	ENGINE TACHOMETER (2)		.98	1.08
19	LANDING GEAR WARNING		.05	
20	HYDRAULIC PRESSURE		.87	3.00
21	PILOT SYSTEM			1.19
22	CLOCK		.43	
23	ALPHA METER - ANGLE ATTACK		.63	
24	ANGLE OF YAW		.63	
25	VECTOR ANGLE		.26	
26	EXHAUST TEMP - DUAL		1.35	2.38
27	VERTICAL SPEED		1.46	
28				
29	RUD., AIL., HORIZ. STAB. POS.		1.11	3.02
30	LOUVER POSITION		1.11	.16
31				
32				
33				
34				
35				
36				
37				
38				
39	MASTER CAUTION IND.		.15	
40	MASTER CAUTION PNL.		1.41	1.36
41				
42				
43				
44				
45				
46				
47				
48				
49				
50	CONSOLE VIBRATOR			.90
51				
52				
53	ATTACHING PARTS			.58
54	SWITCHES, ETC.			.71
55	COLUMN TOTALS		34.10	14.47
56	TOTAL-INSTRUMENTS			34.47
57				73.08

LIST ITEMS BY FUNCTIONAL GROUPS- FLIGHT, ENGINE & MISC. LIST SUB-GROUPS
BY CREW STATION. ADD SUPPLEMENTAL PAGE 26A IF NECESSARY.

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* HYDRAULIC AND PNEUMATIC GROUP

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	X	HYDRAULIC	XX	PNEUMATIC
		UTILITY	EMERG	UTILITY
4	PUMPS, COMPRESSORS MODEL			
5	PUMPS - ENGINE DRIVEN (2)	14.32		
6				
7				
8	OIL COOLERS (2)	6.10		
9				
10				
11				
12	REMOTE PUMP DRIVES			
13	QTY CAP. EA			
14	RESERVOIRS	2 272 IN ³	14.30	
15				
16	AIR BOTTLES			***
17				
18				
19	ACCUMULATORS	7.43		
20	ACCUMULATOR CHARGE FTG.	.80		
21	FILTERS	6.64		
22	PRESSURE REGULATORS			
23	PRESSURE SWITCH	.74		
24	VALVES			
25	CHECK	.16		
26				
27	RELIEF	2.92		
28	CONTROL	.15		
29				
30	CONTROLS			
31	TEMPERATURE INDICATION	.94		
32	LOW PRESS. WARNING	.38		
33	QUICK DISCONNECTS	1.04		
34				
35	PLUMBING	25.39		1.96
36				
37				
38	FLUID IN SYSTEM	25.62		
39	TYPE MIL-O-5606			
40	CAPACITY	3.66 GAL		
41				
42	SUPPORTS-WING			
43	-TAIL			
44	-BODY	6.54		
45	-NACELLE			
46	FURNISHES POWER FOR	**		
47				
48	SEE FOLLOWING PAGE			
49				
50				
51				
52				
53				
54				
55	COLUMN TOTALS	113.47		1.96
56	PAGE TOTAL			115.43
57	TOTAL-HYDRAULIC AND PNEUMATIC GROUP			115.43

SYSTEM PRESSURE PSI 3000

* INCLUDES SYSTEM FROM SOURCES OF POWER TO MAIN DISTRIBUTION POINTS.

** LIST ITEMS AND INDICATE H-HYDRAULIC, P-PNEUMATIC

*** SEE NEXT PAGE

REPORT NO.
64B1.8WEIGHT AND BALANCE REPORT
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HYDRAULIC SYSTEM FURNISHES POWER FOR:

Wing Fan Doors
Main Landing Gear Doors
" " " Retraction
" " " Uplatch
" " " Brakes
" " " Two Positioning
Nose " " Retraction
Aileron
Horizontal Stabilizer
VTOL Pitch, Roll and Yaw Control
VTOL Lift Controls
Diverter Valve
Thrust Spoiler

PNEUMATIC SYSTEM SUPPLIES POWER FOR:

Main Landing Gear Emergency Extension
Nose Landing Gear Emergency Extension
Wing Fan Overspeed Control

*** Upper portion of main landing gear struts contain 210 cu. in. of dry nitrogen at 3000 psig for pneumatic system supply.

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** ELECTRICAL GROUP
A.C. SYSTEM

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1	2	3	POWER SUPPLY	POWER CONVER	DISTR & CONT	LIGHTS- EQUIP. SIGNALS SUPPORTS
4	POWER SUPPLY* KVA VOLT QTY					
5	GENERATORS					
6						
7						
8						
9						
10	REMOT" GENERATOR DRIVES					
11						
12						
13						
14	POWER CONVERSION QTY					
15	CONVERTER AC-DC					
16	TRANSFORMER				.81	
17	RECT. FIFR					
18	MOTOR-GENERATOR					
19	PHASE ADAPTER					
20	FREQUENCY CONVERTER					
21						
22						
23						
24	POWER DISTRIBUTION & CONT					
25	GENERATOR CONTROL BOXES					
26	CUTOUTS, VOLT, REGULATORS					
27	AMMETERS AND VOLTMETERS					
28	SWITCHES, RHEO & PANELS					
29	CIRCUIT BREAKERS & FUSES					
30	JUNCT, FUSE & DIST BOXES					
31	RECEPT & CONNECTOR PLUGS					
32	RELAYS				2.28	
33	WIRING				.86	
34	CONDUIT				.76	
35						
36	LIGHTS AND SIGNAL DEVICES					
37	LIGHTS-INTERIOR					
38	-EXTERIOR - WIRING ONLY					1.11
39	-LANDING-INCL MECH					
40						
41	SIGNAL DEVICES-LIGHTYS					
42	-HORNS					
43	-BELLS					
44						
45	EQUIPMENT SUPPORTS-WING					
46	-TAIL					
47	-BODY					
48	-NACELLE					
49	FURNISHES POWER FOR					
50	SEE FOLLOWING PAGE					
51						
52						
53						
54						
55	COLUMN TOTALS				.81	.90 1.11
56	TOTAL- AC SYSTEM					1.8
57						

* DRIVEN BY- 5 6 7 8 9 *

** INCLUDES SYSTEM FROM SOURCE OF POWER TO MAIN DISTRIBUTION POINTS.

RYAN

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WEIGHT AND BALANCE REPORT
XV-5A

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A.C. SYSTEM FURNISHES POWER FOR:

Engine Ignition
Amplifier-Stab./Augment
3 Axis Rate Gyro
Indicator-Fuel Quantity
Xmtr-Hyd Press.
Ind-Hyd Press.
Xmtr-Eng Oil Press.
Ind-Eng Oil Press.
Ind-Attitude

Valve-Engine Anti-Ice
Xmtr-Fuel Flow
Indicator-Fuel Flow
Flight Instrumentation

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** ELECTRICAL GROUP
D.C. SYSTEM

PAGE
MODEL
REPORT

1	2	3	POWER	POWER	DISTR	LIGHTS	EQUIP.
4	5	6	SUPPLY	CONVER	& CONT	SIGNALS	SUPPORTS
7	8	9					
10	11	12	13	14	15	16	17
18	19	20	21	22	23	24	25
26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41
42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57
58	59	60	61	62	63	64	65
66	67	68	69	70	71	72	73
74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97
98	99	100	101	102	103	104	105
106	107	108	109	110	111	112	113
114	115	116	117	118	119	120	121
122	123	124	125	126	127	128	129
130	131	132	133	134	135	136	137
138	139	140	141	142	143	144	145
146	147	148	149	150	151	152	153
154	155	156	157	158	159	160	161
162	163	164	165	166	167	168	169
170	171	172	173	174	175	176	177
178	179	180	181	182	183	184	185
186	187	188	189	190	191	192	193
194	195	196	197	198	199	200	201
202	203	204	205	206	207	208	209
210	211	212	213	214	215	216	217
218	219	220	221	222	223	224	225
226	227	228	229	230	231	232	233
234	235	236	237	238	239	240	241
242	243	244	245	246	247	248	249
250	251	252	253	254	255	256	257
258	259	260	261	262	263	264	265
266	267	268	269	270	271	272	273
274	275	276	277	278	279	280	281
282	283	284	285	286	287	288	289
290	291	292	293	294	295	296	297
298	299	300	301	302	303	304	305
306	307	308	309	310	311	312	313
314	315	316	317	318	319	320	321
322	323	324	325	326	327	328	329
330	331	332	333	334	335	336	337
338	339	340	341	342	343	344	345
346	347	348	349	350	351	352	353
354	355	356	357	358	359	360	361
362	363	364	365	366	367	368	369
370	371	372	373	374	375	376	377
378	379	380	381	382	383	384	385
386	387	388	389	390	391	392	393
394	395	396	397	398	399	400	401
402	403	404	405	406	407	408	409
410	411	412	413	414	415	416	417
418	419	420	421	422	423	424	425
426	427	428	429	430	431	432	433
434	435	436	437	438	439	440	441
442	443	444	445	446	447	448	449
450	451	452	453	454	455	456	457
458	459	460	461	462	463	464	465
466	467	468	469	470	471	472	473
474	475	476	477	478	479	480	481
482	483	484	485	486	487	488	489
490	491	492	493	494	495	496	497
498	499	500	501	502	503	504	505
506	507	508	509	510	511	512	513
514	515	516	517	518	519	520	521
522	523	524	525	526	527	528	529
530	531	532	533	534	535	536	537
538	539	540	541	542	543	544	545
546	547	548	549	550	551	552	553
554	555	556	557	558	559	560	561
562	563	564	565	566	567	568	569
570	571	572	573	574	575	576	577
578	579	580	581	582	583	584	585
586	587	588	589	590	591	592	593
594	595	596	597	598	599	600	601
602	603	604	605	606	607	608	609
610	611	612	613	614	615	616	617
618	619	620	621	622	623	624	625
626	627	628	629	630	631	632	633
634	635	636	637	638	639	640	641
642	643	644	645	646	647	648	649
650	651	652	653	654	655	656	657
658	659	660	661	662	663	664	665
666	667	668	669	670	671	672	673
674	675	676	677	678	679	680	681
682	683	684	685	686	687	688	689
690	691	692	693	694	695	696	697
698	699	700	701	702	703	704	705
706	707	708	709	710	711	712	713
714	715	716	717	718	719	720	721
722	723	724	725	726	727	728	729
730	731	732	733	734	735	736	737
738	739	740	741	742	743	744	745
746	747	748	749	750	751	752	753
754	755	756	757	758	759	760	761
762	763	764	765	766	767	768	769
770	771	772	773	774	775	776	777
778	779	780	781	782	783	784	785
786	787	788	789	790	791	792	793
794	795	796	797	798	799	800	801
802	803	804	805	806	807	808	809
810	811	812	813	814	815	816	817
818	819	820	821	822	823	824	825
826	827	828	829	830	831	832	833
834	835	836	837	838	839	840	841
842	843	844	845	846	847	848	849
850	851	852	853	854	855	856	857
858	859	860	861	862	863	864	865
866	867	868	869	870	871	872	873
874	875	876	877	878	879	880	881
882	883	884	885	886	887	888	889
890	891	892	893	894	895	896	897
898	899	900	901	902	903	904	905
906	907	908	909	910	911	912	913
914	915	916	917	918	919	920	921
922	923	924	925	926	927	928	929
930	931	932	933	934	935	936	937
938	939	940	941	942	943	944	945
946	947	948	949	950	951	952	953
954	955	956	957	958	959	960	961
962	963	964	965	966	967	968	969
970	971	972	973	974	975	976	977
978	979	980	981	982	983	984	985
986	987	988	989	990	991	992	993
994	995	996	997	998	999	1000	1001

* DRIVEN BY - 5 6 7 8 9
** INCLUDES SYSTEM FROM SOURCE OF POWER TO MAIN DISTRIBUTION POINTS.

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D.C. SYSTEM FURNISHES POWER FOR:

FLIGHT CONTROLS

Sol Valve-Wing Fan Doors
Sol Valve-Diverters
Sol Valve-Stab/Fan Speed
Sol Valve-Stab/High Speed
Sol Valve-Stab/Trim
Sol Valve-Spoilers
Sol Valve-Low Airspeed Ind.
Astr-Aleron Trim
Astr-Rudder Trim
Astr-VTOL Roll Trim
Astr-VTOL Yaw Trim
Astr-VTOL Pitch Trim
Astr-Thrust Vector
Astr-Wing Fan Drvr Lever
Astr-Pitch Fan Inlet Lever
Astr-Aleron Damp
Astr-Wing Flaps
Relay-Wing Flaps Control
Controller-Stab/Aug. System
Flight Control Electrical Mixer

INSTRUMENT

Fan Speed Ind. and Limiting Control
Sol Valve-Throttle Cutback
Ind-Vector Angle
Ind-Flap/Spoiler
Ind-VTOL Trim
Ind-CPOL Trim
Ind-Landing Gear Position

FLIGHT INSTRUMENT

Ind-Turn and Slip
Test Instrumentation (F.T.)

LANDING GEAR

Sol Valve-Nose Gear
Sol Valve-Main Gear
Sol Valve-Main Gear Door
Sol Valve-Main Gear Mode

POWER

Inverter
Relay-Battery
Relay-Emer. Bus.
Relay-Nonessential Bus
Relay-Gen. Monitor

FUEL AND OIL

Sol Valve-Fuel Booster Pump
Motor Valve-Fwd. Fuel Tank
Motor Valve-Aft Fuel Tank
Motor Valve-Fuel Cross-over

RADIO

Transmitting
Receiving

DC CONTROL FOR AC POWER
Relay-Inverter On/Off

WARNING

Fire Detect and Structure Overheat
Fans Frame and Bearing Overheat
Annunciator Panel
Sig.Gen.-Audible Warning
Lamp-Condition (MS25351)
Diverter (Fan Mode)
Fan Doors Locked
Fan Doors Unlocked
Stab.Aug.-Pri.
Stab.Aug.-Stby.
Landing Gear STOL
Pwr. Bus Monitors

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ELECTRONICS GROUP

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1 EQUIPMENT COMPONENTS AND 2 PART NUMBERS OR IDENT		X EQUIPMENT XX		
3 LIST BY FUNCTIONAL GROUPS		GFAE	CPE	INSTL
4				
5	UHF TRANSCEIVER ARC/51X			
6	TRANSCEIVER RT-702			30.30 .94
7				
8	ANTENNA AT 256A			2.24 .08
9	CABLING			3.18
10	CONTROL UNIT C5984			2.00
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
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31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47	ELECTRONIC INSTALLATION			
48	TABLES			
49	RACKS, SHELVES & SUPPORTS			
50	LOCKERS			
51				
52				
53				
54				
55	COLUMN TOTALS			
56	PAGE TOTAL			
57	TOTAL-ELECTRONIC GROUP			

* LIST COMPONENTS- INCL RADOMES, MTS, ANT, SWITCHES, RELAYS, FILTERS, ETC FROM MAIN DISTRIBUTION POINT TO UNIT OPERATED, BY FUNCTIONAL GROUPS-E.G. COM, VHF, SEARCH, NAV, INTERCOMM, ETC. ADD SUPPLEMENTAL PG 31A IF NEC.

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FURNISHINGS AND EQUIPMENT GROUP
ACCOMODATIONS FOR PERSONNEL

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1	X CREW SEATS AND PASSENGER CHAIRS ## XX MISC	ACCOM
2	ASST	
3	PILOT PILOT	G OXYGEN
4	SEATS AND CHAIRS	
5	CUSHION	
6	SEAT 148.80	
7	SAFETY BELT	
8	HARNESS & INERTIA REEL	
9	ADJUSTING MECHANISM	
10	CATAPULT OR EJECT. MECH	
11	TRACKS AND SUPPORTS 17.72	
12	HEADREST	
13		
14		
15		
16		
17	MISC ACCOMODATIONS	
18	BUNKS AND SUPPORTS	
19		
20	LITTER SUPPORTS	
21	KNEELING PADS	
22	PARACHUTE STOWAGE PROV	
23	TOILET AND RELIEF TUBES	
24	WASH BASINS & SHOWERS	
25	WATER TANKS & PIPING	
26	DRINKING WATER PROV	
27	LOCKERS-FOOD	
28	LOCKERS-PERSONAL EFFECTS	
29		
30		
31		
32		
33	GALLEY STOVES, HOTPLATES	
34	REFRIGERATOR	
35		
36		
37		
38	ANTI-G SUIT PROVISIONS	
39		
40	OXYGEN INSTALLATION - INCLUDED WITH EJECTION SEAT	
41*	BOTTLES TYPE SIZE QTY	
42		
43		
44		
45		
46	CONVERTER	
47*	REGULATORS	
48	SUPTS-BOTTLES, REGULATORS	
49	PLUMBING, ETC	
50		
51		
52		
53		
54		
55	COLUMN TOTALS 166.52	
56	TOTAL-PERSONNEL ACCOMODATIONS	166.52
57		

* OXYGEN BOTTLE INCLUDING CHARGE, IF NOT SPECIFIED AS USEFUL LOAD OR
SPECIAL EQUIPMENT

** ADD ADDITIONAL PAGE 34A IF NECESSARY.

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FURNISHINGS AND EQUIPMENT GROUP
MISC EQUIPMENT AND FURNISHINGS

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1	2	3	MISC EQUIP.	FURN
4	MISCELLANEOUS EQUIPMENT			
5*	PORT. PLATFORMS, LADDERS			
9	BALANCE COMPUTER & SUPT			
6				
7	DATA CASES OR HOLDERS			
8	MANUALS-FLIGHT & MAINT			
10				
11				
12	TOOL LOCKERS			
13				
14	WINDSHIELD WIPER, WASHER			
15	REL MECH-TARGET & TOW			
16				
17	BILGE SYSTEM			
18	STALL WARNING DEVICES			
19	REAR VIEW MIRROR			
20				
21	AUXILIARY FLOORING			
22	INSTRUMENT BOARDS			4.91
23	CONSOLES			5.61
24	CONTROL STANDS			
25	INST. PANEL SUPPORTS			1.54
26*	CARGO HANDLING EQUIPMENT			
27	RAMPS			
28	HOISTS AND BOOMS			
29	MONORAILS			
30	MONORAIL MOTORS			
31	TIE DOWN FITTINGS			
32				
33				
34				
35	PYROTECHNIC INSTALLATION			
36	SIGNAL PISTOL HOLDER			
37	AMMO HOLDER-CAP,-			
38	PARA FLARE			
39	-CONTAINER-CAP,-			
40	-RACKS -CAP,-			
41	-RELEASE MECHANISM			
42	SMOKE CANDLE-HANDLE			
43				
44	FLOATLIGHT RACK & REL			
45	CAP,-			
46	FURNISHINGS			
47	FLOOR COVERING, RUGS ETC			
48	SOUNDPROOFING & INSUL			
49	TRIM			
50	CURTAINS AND SCREENS			
51	CRASH PADDING			
52	PARTITIONS-NON STRUCT			
53				
54				
55	COLUMN TOTALS			12.06
56	TOTAL-MISCELLANEOUS EQUIPMENT AND FURNISHINGS			12.06
57				

* IF NOT SPECIFIED AS SPECIAL EQUIPMENT

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FURNISHINGS AND EQUIPMENT
EMERGENCY EQUIPMENT

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1	X FIRE PREVENTION & DETECTION SYSTEMS XX OTHER			
2	ENGINE	BAGGAGE	FUEL	OTHER
3	COMPT	COMPT	COMPT	EMERG EQUIP
4	FIRE PREVENT AND DETECTION			
5	BOTTLES	TYPE	SIZE	QTY
6	BOTTLES		2	12.44
7				
8				
9				
10				
11	PORTABLE			
12				
13				
14				
15				
16	CONTROLS		3.17	
17	PLUMBING		4.93	
18	BOTTLE SUPTS-FIXED EXT		.20	
19				
20				
21	BOTTLE SUPTS-PORT, EXT			
22				
23				
24	FIRE DETECTION SYSTEM		9.36	
25	STRUCTURAL OVERHEAT WARNING			4.27
26	FIRE RESISTANT PAINT			
27	FIRE CURTAINS			
28				
29	OTHER EMERGENCY EQUIPMENT			
30	FIRST AID KITS & SUPTS			
31	FLASHLIGHTS-QTY			
32				
33	STOWAGE-EMERG FOOD, WATER			
34				
35*	LIFE RAFTS	TYPE	QTY	
36				
37				
38				
39	LIFE RAFT SUPPORTS			
40				
41	DITCHING STATION EQUIP			
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55	COLUMN TOTALS		30.10	4.27
56	TOTAL-EMERGENCY EQUIPMENT			34.37
57	TOTAL-FURNISHINGS & EQUIPMENT GROUP - PG 34-36			212.95

* IF NOT SPECIFIED AS USEFUL LOAD OR SPECIAL EQUIPMENT.

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AIR CONDITIONING AND ANTI-ICING
EQUIPMENT GROUP
AIR CONDITIONING

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1	2	3	PRESS.	VENTIL	HEATING	COOLING
4	5	6	SYSTEM	SYSTEM	SYSTEM	SYSTEM
**HEAT EXCHANGERS-QTY						
6**HEATERS-BTU EA	QTY					
7						
8						
9						
10						
11HEATING FLUID-	GAL					
12						
13COMPRESSORS OR SUPCHGRS						
14						
15MOTORS						
16TURBINES						
17FANS						13.53
18						
19						
20TANKS						
21WATER SEPARATOR						
22REGULATOR						
23						
24						
25SCOOPS						
26DUCTING						14.42
27SHROUDS						
28						
29PLENUM CHAMBER						4.99
30PLUMBING						
31						
32						
33BOMB BAY HEATING						
34						
35						
36						
37						
38						
39CONTROLS						
40 -MANUAL						
41						
42 -ELECTRICAL						
43						
44 -HYDRAULIC						
45						
46 -PNEUMATIC						
47						
48SUPPORTS & BRACKETS-WING						
49 -TAIL						
50 -BODY						
51 -NACELLE						
52						
53						
54PRESSURIZATION SEALING						
55COLUMN TOTALS						33.12
56TOTAL-AIR CONDITIONING						33.15
57						

* IF NOT SPECIFIED AS SPECIAL EQUIPMENT.

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AIR CONDITIONING AND ANTI-ICING EQUIPMENT GROUP ANTI-ICING

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			WING	TAIL	AIR INDUCT.	ENGINE	CANOPY & FUEL WINDSHLD SYSTEM
4	*HEATERS	BTU EA	QTY				
5							
6							
7							
8							
9							
10							
11	*HEAT EXCHANGERS						
12							
13							
14							
15	DUCTING						
16	SHROUDING						
17							
18							
19	*BOOTS						
20							
21	*ATTACHING STRIPS						
22							
23	OIL SEPARATORS						
24							
25	AIR PUMPS						
26							
27	AIR LINES AND HOSES						
28							
29	TANKS						
30							
31	*FLUID-		GAL				
32							
33							
34							
35	PLUMBING						
36							
37							
38	DISTRIBUTOR						
39	-VALVE						
40	-CONTROLS						
41							
42	CONTROLS						
43	-MANUAL						
44	-ELECTRICAL						
45	-HYDRAULIC						
46	-PNEUMATIC						
47							
48	**CIRCUITRY					1 12	
49	SUPPORTS AND BRACKETS-WING						
50	-TAIL						
51	-BODY						
52	-NACELLE						
53							
54							
55	COLUMN TOTALS					1.12	
56	TOTAL-ANTI-ICING						1.12
57	TOTAL-AIR CONDITIONING AND ANTI-ICING GROUP - PG 37-38						34.27

* IF NOT SPECIFIED AS SPECIAL EQUIPMENT

** FROM MAIN DISTRIBUTION POINT TO ACTUATING UNIT.

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AUXILIARY GEAR GROUP

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1			
2			
3		HANDLING ARREST & CATAPULT	ATO
4	HANDLING GEAR		
5	ANCHOR		
6	ANCHOR LINE		
7	PENDANT & CLAMP FITTING		
8	LIZARD		
9	SHEAVES		
10	WINCH-COMPLETE		
11	WINCH CRANK		
12	ANCHOR RIG OR DAVIT		
13	WINCH ENGINE OR MOTOR		
14			
15*	HOISTING SLING		
16	WING HANDLING LINES		
17	WATER RUDDER		
18	FITTINGS		
19	-RECOVERY HOOK		
20	-BEACH GEAR ATTACHMENT		
21	-TIEDOWN		
22	-JACKING	.49	
23	-TOWING		
24	-MOORING & SNUBBING		
25	-ANCHORAGE		
26	-LEVELING	.17	
27	-HOISTING		
28			
29	ARRESTING OR DECELER GEAR		
30	TRAILING HOOK		
31	HOOK POINT-TYPE		
32	EXTENSION GEAR		
33	RETRIEVING GEAR		
34	BUMPER		
35	SHOCK ABSORBER		
36	ATTACHMENT FITTINGS		
37	BARRIER CRASH FITTINGS		
38			
39	DECELERATION-PARACHUTE	13.60	
40	-CONTAINER & FITTINGS	5.37	
41	-CONTROLS	7.76	
42			
43	CATAPULTING GEAR		
44	CATAPULT FITTINGS		
45	CATAPULT HOOKS		
46	HOLD BACK FITTINGS		
47			
48	ASSISTED TAKE OFF		
49	HOOKS		
50	CONTROLS-FIRING		
51	-BOTTLE RELEASE		
52			
53	BOTTLE STOWAGE PROV		
54	QTY BOTTLES-		
55	COLUMN TOTALS	.66	26.73
56	PAGE TOTAL		27.39
57	TOTAL-AUXILIARY GEAR GROUP		27.39

* IF NOT SPECIFIED AS SPECIAL EQUIPMENT.

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2.4 Actual Weight and Center of Gravity		

AN-82-48-A

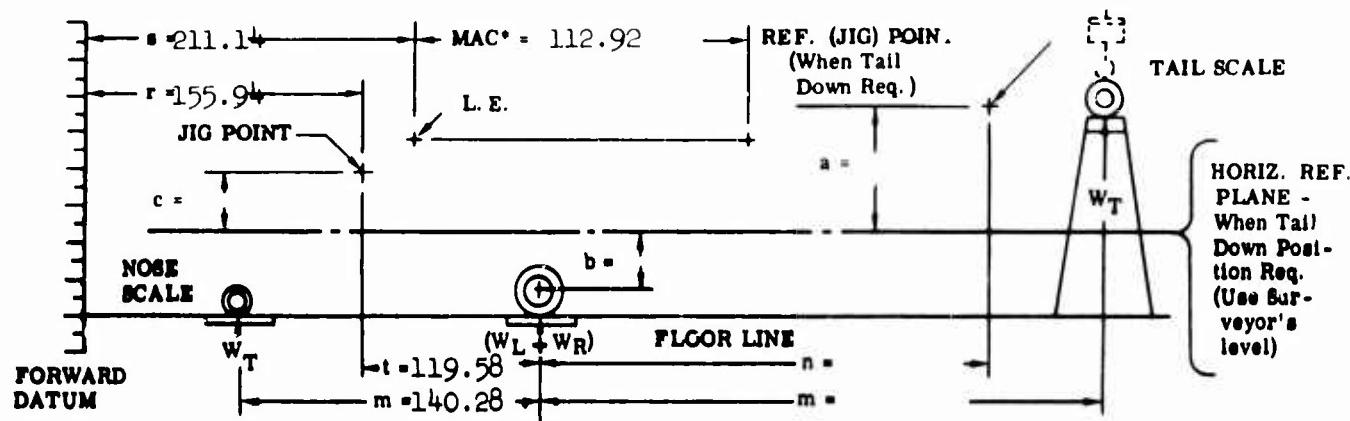
Load Condition EMPTY
 Prepared by M. Senio
 Date 1 December 1964

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AIRCRAFT ACTUAL WEIGHT AND HORIZONTAL BALANCE

Contract No. DA44-177-TC-715, Gov't. No. 62-4506, Fact. No. 2, Art. No. 2

SCALE POSITION	SCALE NO.	SCALE READING (Lbs.)	TARE	SCALE ERROR	SYMBOL	NET WEIGHT
Left Main Wheel		3260	12			3248
Right Main Wheel		3320	10			3310
Nose Wheel		2140	12			2128
TOTAL WEIGHT		8720	34			8686



CENTER OF GRAVITY TO FORWARD DATUM (HORIZ. DIST. - AS WEIGHED)

Tail Wheel Type: $r + t + \frac{W_T \times m}{W}$ In.

Nose Wheel Type: $r + t - \frac{W_T \times m}{W} = 275.52 - \frac{2128 \times 140.28}{8686} = 241.15$ In.

CORRECTED WEIGHT & HORIZONTAL BALANCE

ITEMS ADDED & SUBTRACTED	WEIGHT (Lbs.)	H-DIST (In.) C.G. TO FWD. DATUM	MOMENT (In. - Lbs.)	GUARANTEED
Aircraft as Weighed	8686.00	241.15	2094629	
Plus - See Pages	122.47		53291	
Minus - See Pages	- 745.21		- 145333	
TOTAL EMPTY WEIGHT	8063	248.37	2002587	
BALANCE - (H-Dist.) - % M.A.C. (Corrected) - M.A.C.	248.37 - 211.14 112.92	33.0	% M.A.C.	to % M.A.C. % M.A.C.

*M.A.C. calc. in accord. with Handb'k Sec. II, Part II, (Army) or SR-7 (Navy)

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ITEMS ON AIRPLANE THAT ARE NOT PART OF WEIGHT EMPTY:

	<u>WEIGHT</u>	<u>ARM</u>	<u>MOMENT</u>
143P085 Auxiliary Fuel Tank	35.17	339.0	11,922
Oil - Engine & Trapped	15.00	204.0	3,060
Ldg. Gear Steel Fairing Vs Doors	68.00	313.5	21,318
Exterior Paint	33.00	278.0	9,108
Aircraft Damage Repair Disposition Dated 4-15-64	8.12	125.0	1,015
Repair of Pitch Fan Bellmouth and Vanes	4.33	62.0	268
Patches on Vert. & Horiz. Stabilizer Skins to Facilitate Modification	2.60	480.0	1,248
143P047 Gear Box Mount Repair	.19	195.0	37
The Following Material Review Requests			
No. 29538 Tail Skid Beef-up	.25	480.0	120
No. 29551 Repair Crack in F004-276	.10	110.0	11
No. 29558 Repair Crack in K004-1	.10	125.0	13
No. 29571 Repair P006-19 Flapper	.15	200.0	30
No. 36501 Fix P006 Fire Doors	.12	200.0	24
No. 36511 Repair Cracks in P034 Door	.30	80.0	24
No. 36593 Patch F016-25	.06	470.0	28
No. 36618 Repair Wing Tip	1.50	240.0	360
No. 36641 Patch P010 Inlet	.50	59.0	30
No. 36644 Patch Skin Cracks	.06	260.0	16
No. 36682 Reinforce T/M Antenna Bracket	.40	160.0	64
Ballast for Vertical Gyro	6.00	115.0	690
Emergency Escape Axe	2.00	140.0	280
Auxiliary Oxygen System	19.00	147.0	2,793
Bracket & Battery -- Camera	22.30	130.0	2,899
Instrumentation	515.00	162.0	84,472
Parachute - 12.75 Ft. Dia.	10.90	500.0	5,450
TOTAL DEDUCTIONS	745.21		145,333

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2.5 Weight Empty - Weight and Balance Summary

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<u>WEIGHT EMPTY - WEIGHT AND BALANCE SUMMARY</u>					
	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
WING	1059.27	263.5	279151	104	109956
TAIL	267.07	493.9	131907	184	49141
BODY	1340.69	249.8	334885	109	145476
LANDING GEAR (Gear Up)	(481.85)	279.5	(134688)	91	(43650)
Main Gear	399.56	313.3	125184	93	37014
Nose Gear	82.29	115.5	9504	81	6636
SURFACE CONTROLS	440.20	233.0	102549	104	45827
ENGINE SECTION	44.55	250.0	11138	139	6174
PROPELLSION	(3676.34)	234.7	(863513)	116	(425248)
Gas Generator Section	1257.92	242.0	304007	142	179504
Lift Fan Section	1905.74	255.8	487475	102	194100
Pitch Fan Section	337.18	91.9	31004	93	31492
Fuel System	124.39	240.5	29917	117	14561
Engine Controls	42.90	215.9	9261	109	4685
Starting System	8.21	225.2	1849	110	906
FIXED EQUIPMENT	(698.33)		(140226)		(81218)
Instruments	73.00	163.2	11920	120	8776
Hydraulics & Pneumatics	115.43	183.3	21153	123	14158
Electrical	195.57	253.4	49552	117	22962
Radio	39.64	153.3	6075	95	3763
Furnishings & Equipment	212.95	152.0	32641	112	23953
Air Conditioning & Anti-Icing	34.27	192.6	5002	137	4690
Auxiliary Gear	27.39	448.1	12273	106	2916
UNACCOUNTABLE WEIGHT	54.70		4530		4429
TOTAL WEIGHT EMPTY (Gear Up)	8063.00	248.4	2002587	113	911119

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2.6 Weight Empty - Weight and Balance Details

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
WING GROUP	(1059.27)	263.5	(279151)	104	(109956)
Basic Structure	(567.20)	255.7	(145032)	102	(57624)
Center Section	(423.12)	250.2	(105879)	101	(42744)
Upper Skin and Supports	(31.28)	254.9	(7973)	105	(3298)
Interspar Skin	17.29	251.9	4356	107	1850
Skin Joints, Splices, etc.	8.81	259.6	2287	102	903
Brackets - Skin Support	5.18	256.7	1330	105	545
Lower Skin and Supports	(36.41)	256.6	(9343)	96	(3492)
Interspar Skin	25.07	257.5	6456	95	2393
Skin Joints, Splices, etc.	4.44	252.9	1123	96	428
Brackets - Skin Support	6.90	255.7	1764	97	671
Front Spar	94.34	217.0	20473	101	9528
Rear Spar	88.50	296.5	26240	101	8339
Ribs - Interspar	4.42	263.3	1164	100	442
Bulkhead @ B.L. 100.75	23.09	261.6	6041	102	2351
Joints, Splices and Fasteners	5.83	260.0	1516	99	577
Fan Ring	25.95	258.1	6697	101	2624
Leading Edge	(63.37)	208.6	(13220)	101	(6407)
Skin	36.00	207.2	7460	101	3643
Ribs	22.09	209.4	4626	101	2231
Joints, Splices & Fasteners	5.28	214.8	1134	101	533
Trailing Edge	(23.60)	303.9	(7172)	103	(2435)
Skin	16.95	304.6	5163	103	1754
Ribs	3.75	300.2	1126	102	383
Auxiliary Spar	1.58	306.0	483	103	163
Joints, Splices & Fasteners	1.32	303.4	400	103	135
Attach Fittings - Wing to Body	26.33	229.4	6040	101	2650
Outer Panel	(144.08)	271.7	(39153)	103	(14879)
Skin	56.04	272.0	15243	104	5811
Front Spar	14.79	252.5	3734	103	1524
Rear Spar	13.55	296.5	4018	103	1401
Doublers - Skin	3.90	288.6	1126	99	386
Ribs	29.82	271.5	8096	103	3067
Joints, Splices & Fasteners	1.77	293.2	519	102	181

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

WING GROUP (Cont'd.)

Basic Structure (Cont'd.)

Outer Panel (Cont'd.)

Leading Edge	(14.48)	245.5	(3555)	103	(1497)
Skin	10.80	245.7	2653	103	1117
Ribs	2.48	248.1	615	104	257
Joints, Splices & Fasteners	1.20	238.9	287	103	123

Trailing Edge	(5.69)	299.6	(1704)	103	(588)
Skin	3.48	299.6	1043	103	357
Stiffeners	.71	301.5	214	106	75
Ribs	1.27	298.7	379	104	132
Joints, Splices & Fasteners	.15	298.9	45	99	15

Tips	4.12	286.7	1181	105	433
------	------	-------	------	-----	-----

Secondary Structure

Doors, Panels & Miscellaneous	(353.84)	258.3	(91397)	108	(38338)
-------------------------------	-----------	-------	----------	-----	----------

Access Doors	15.88	273.7	4346	100	1584
Fan Doors	(259.57)	(66541)	(66541)	(28552)	
Fan Door Structure	126.56	256.0	32401	110	13932
Hinges and Supports	27.16	255.9	6951	112	3053
Power Transmission	17.47	272.5	4760	105	1838
Actuator	27.36	256.0	7004	109	2982
Actuator - Support	41.05	256.0	10508	112	4594
Lock Mechanism	19.97	246.2	4917	108	2153
Fan Seal	16.30	245.6	4149	104	1697
Seal-Trailing Edge-Flap	1.64	311.1	510	103	169
Insulation - External	29.59	269.4	7972	104	3144
Fairings and Fillets	30.86	255.3	7879	103	3192

Control Surfaces

Ailerons	(138.23)	309.1	(42722)	101	(13994)
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Spars	(61.69)	306.5	(18908)	103	(6361)
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Ribs	5.60	305.5	1711	103	576
Skin and Stiffeners	8.81	307.4	2708	103	910
Trailing Edge Strip	9.77	307.1	3001	104	1015
Tips	.42	320.4	135	105	44
Tabs	1.80	306.5	552	106	191
Tab Structure	(11.69)	318.6	(3725)	102	(1188)
Balence Weights	8.11	319.4	2590	102	826
	5.00	317.2	1586	101	50

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

WING GROUP (Cont'd.)

Control Surfaces (Cont'd.)

Ailerons (Cont'd.)

WEIGHT	HORIZONTAL		VERTICAL	
	ARM	MOMENT	ARM	MOMENT
Aerodynamic Seals	1.66	298.0	495	104
Access Doors	.69	310.0	214	105
Hinges and Pins	1.38	306.8	423	103
Control Surface Supports	(18.45)	297.8	(5495)	103
Hinges	14.12	299.2	4224	103
Brackets	4.33	293.4	1271	103
Flaps	(76.54)	311.1	(23814)	100
Spars	8.95	310.0	2774	100
Stringers	1.48	317.1	469	100
Ribs	14.00	311.2	4356	100
Skin & Stiffeners	34.35	312.9	10747	100
Trailing Edge Strip	1.80	324.0	583	100
Actuator Attach Structure	2.10	308.7	765	100
Hinges and Pins	7.23	307.8	2226	100
Control Surface Supports	(6.25)	303.0	(1894)	96
Hinges	4.85	301.5	1462	97
Brackets	1.40	308.7	432	94

TAIL GROUP

Horizontal Stabilizer	(107.63)	500.0	(53225)	205	(21783)
Skin	20.64	504.4	10412	206	4251
Front Spar	2.73	483.1	1319	206	562.
Center Spar	8.43	496.0	4181	206	1737
Rear Spar	3.44	513.7	1767	203	697
Ribs	15.10	502.3	7592	206	3109
Joints, Splices & Fasteners	2.15	497.1	1069	206	443
Leading Edge	(8.72)	485.5	(4234)	206	(1796)
Skin	6.24	485.0	3027	206	1285
Ribs	2.48	486.5	1207	206	511
Trailing Edge	(.71)	521.1	(370)	206	(146)
Stiffeners	.05	533.1	27	206	10
Ribs	.66	519.2	343	206	136
Fibreglass Fairing	35.90	483.2	17348	196	7025
Tips	4.26	510.6	2175	206	878
Actuator Fitting	.29	483.8	140	205	59
Pivot Fitting	1.39	496.1	690	204	283
Aerodynamic Seal Attachment	.91	513.7	467	206	187
Exterior Finish	2.96	493.7	1461	206	610

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

TAIL GROUP (Cont'd.)

Vertical Stabilizer

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
Skin	25.76	484.6	12484	165	4250
Front Spar	4.65	458.7	2133	161	750
Center Spar	10.23	478.6	4896	163	1669
Rear Spar	3.01	498.6	1501	151	455
Ribs	20.71	483.1	10006	167	3455
Leading Edge	(7.66)	453.7	(3475)	164	(1260)
Skin	4.67	452.6	2114	165	771
Ribs	2.99	455.2	1361	163	489
Trailing Edge	(.96)	505.2	(485)	160	(154)
Stiffeners	.68	502.1	341	154	104
Ribs	.28	513.9	144	180	50
Fibreglass Fairing	2.77	514.1	1424	190	527
Actuator Fitting	.42	474.9	199	186	78
Pivot Fitting	2.59	495.8	1284	200	518
Access Doors	2.60	488.6	1270	185	480
Aerodynamic Seal Attachment	.41	500.0	205	155	64
Exterior Finish	1.99	476.5	948	160	318

Dorsal Fin

Skin	1.54	420.0	647	145	223
Joints, Splices & Fasteners	.63	419.3	264	148	93
Frames	.88	426.6	375	145	128
Exterior Finish	.10	420.0	42	145	14

Elevator

Spars	2.14	518.2	1109	206	441
Ribs	2.44	521.8	1273	206	503
Skin	8.70	522.4	4545	206	1792
Trailing Edge Strip	.60	530.5	318	206	124
Torque Tube	3.15	517.8	1631	206	649
Balance Weights & Supports	17.56	515.0	9044	206	3617
Aerodynamic Seal	1.23	515.0	633	206	253
Access Doors	.38	517.7	197	206	79
Hinges and Pins	1.78	517.8	922	206	367
Control Surface Support Hinges	2.12	517.1	1096	206	437

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

TAIL GROUP (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
Rudder	(32.43)	501.9	(16276)	144	(4660)
Spars	4.55	504.3	2295	149	678
Ribs	1.83	507.0	928	146	267
Rib Attach Angles	.11	507.0	56	138	15
Skin	4.02	507.7	2041	151	607
Trailing Edge Strip	.24	520.8	125	161	39
Tab	1.88	512.3	963	131	247
Torque Tube	3.48	496.2	1727	122	424
Balance Weights & Supports	12.21	498.0	6081	148	1803
Aerodynamic Seal	.84	500.1	420	154	129
Access Doors	.53	505.4	268	130	69
Hinges and Pins	.96	512.0	492	168	162
Control Surface Supports	(1.78)	494.4	(880)	124	(220)
Hinges	.69	495.3	342	120	83
Brackets	.77	492.3	379	122	94
Actuator	.32	496.6	159	134	43
BODY GROUP	(1340.69)	249.8	(334885)	109	(145476)
Basic Structure	(798.91)	257.0	(205307)	110	(88044)
Bulkhead and Frames	(325.09)	254.4	(82716)	110	(35872)
Front Hinge Frame	3.92	35.2	138	93	364
Rear Hinge Frame	12.40	80.3	996	83	1031
Frame - Sta. 91	12.49	90.3	1128	97	1216
Bulkhead - Sta. 214	47.13	214.1	10090	106	4993
Canted Bulkhead - Sta. 146	27.76	148.5	4121	108	3002
Bulkhead - Sta. 165.2	14.46	165.0	2386	106	1530
Frame, Engine Support - Sta. 214	13.63	210.4	2867	150	2049
Bulkhead - M.L.G. Drag Strut	20.25	317.0	6419	112	2277
Bulkhead - M.L.G. - Sta. 287	20.06	287.0	5757	125	2502
Bulkhead - Rear Spar - Sta. 296	39.49	296.5	11709	104	4114
Bulkhead - Stab. Front Spar	5.12	432.8	2216	119	608
Bulkhead - Stab. Center Spar	6.30	456.6	2876	116	732
Bulkhead - Stab. Rear Spar	3.44	488.4	1680	120	413
Minor Frames	98.64	307.5	30333	112	11041

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

BODY GROUP (Cont'd.)

Basic Structure (Cont'd.)

ITEM	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
Truss Structure	114.03	252.6	28802	114	12999
Joints, Splices & Fasteners	19.51	293.4	5724	110	2151
Vertical Stiffeners	2.55	131.2	334	106	271
Skin - Upper Between Longerons	25.33	348.7	8831	143	3615
Skin - Side Between Longerons	50.31	299.3	15057	112	5637
Skin - Lower Between Longerons	21.43	335.0	7179	94	2004
Horizontal Stiffeners	4.51	215.8	973	111	500
Stringers - Side	6.99	186.4	1303	112	783
Wing L.E. Attach Fittings	.78	189.0	147	100	78
Drag Angle - Fuselage to Fin	4.99	440.0	2196	135	674
Longerons - Upper	36.55	264.0	9648	127	4626
Longerons - Lower	40.43	277.4	11217	98	3967
Longerons - Upper External	8.04	349.1	2807	152	1221
Horizontal Shear Webs	65.05	239.1	15551	107	6974
Flooring and Supports	21.21	158.6	3363	94	1984
Nose Wheel Well	12.89	117.4	1513	82	1054
Main Gear - Door Support Structure	21.18	309.4	6554	89	1887
- tch Fan Mount Structure	15.63	67.8	1059	98	1527
Pitch Fan Cutout Keelson	1.32	57.9	76	77	102
Miscellaneous	1.09	235.6	257	108	118
Secondary Structure	(157.65)	141.3	(22277)	122	(19184)
Enclosure	(68.16)	132.7	(9045)	131	(8938)
Canopy	63.13	131.1	8273	131	8256
Canopy Hinge Structure	4.25	160.4	682	141	598
Canopy Latch Structure	.78	115.7	90	108	84
Windshield	53.94	104.5	5636	122	6607
Heat Shielding - Internal	8.85	170.7	1511	107	949
Jack Pad Provisions	1.07	394.0	422	97	104
Nose Cone	14.85	17.9	265	94	1394
Tail Cone	9.16	500.7	4586	112	1026
Tail Bumper	1.62	501.0	812	102	166
Doors, Panels & Miscellaneous	(384.13)	279.3	(107301)	100	(38248)
Nose Ldg. Gear Door	(11.31)	114.2	(1292)	77	(875)
Door Structure	7.31	117.8	861	75	551
Door Mechanism	4.00	107.9	431	81	324

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

BODY GROUP (Cont'd.)

Doors, Panels & Miscellaneous(Cont'd.)

WEIGHT	HORIZONTAL		VERTICAL	
	ARM	MOMENT	ARM	MOMENT
Main Ldg. Gear Door	(111.91)	310.2	(34714)	84
Door Structure	66.46	310.1	20610	82
Mechanism and Controls	5.89	317.0	1867	85
Power Transmission	3.71	326.2	1210	90
Actuator	35.85	307.6	11027	88
Access Doors - Miscellaneous	29.97	247.5	7418	91
Access Door - Spin Chute	2.31	470.2	1086	113
Access Door - Sta. 100 to 133	7.36	116.2	855	79
Access Door - Elect. Compt.	7.02	155.6	1092	100
Panels	(147.68)	237.6	(35087)	115
Access - Top - Sta. 214-287	47.54	248.7	11824	151
Access - Side - Sta. 214-287	36.30	249.3	9051	121
Access - Lower - Sta. 165-276	52.88	222.4	11760	82
Seal - Fuselage to Canoe	2.65	285.0	755	94
Closure - Pitch Fan	2.81	63.8	179	96
M.L.G. Well Protective	3.39	308.1	1044	102
Cover - Mechanical Mixer	2.11	224.7	474	101
Fairing - Tail Pipe Exit	19.88	417.4	8298	95
Exterior Finish	5.59	311.3	1740	110
Insulation - External	28.40	354.5	10068	101
Exhaust Deflector Plate	12.70	445.0	5651	103

ALIGHTING GEAR GROUP
(Retracted Position)

Main Gear	(399.56)	313.3	(125184)	93	(37014)
Runn. ng Gear	(80.98)	352.7	(28562)	92	(7450)
Wheels, 20 x 4.4 (2)	28.90	352.7	10193	92	2659
Tires, 20 x 4.4, 12 Ply, Type VII	23.70	352.7	8359	92	2180
Brakes	28.38	352.7	10010	92	2611
Structure	(258.23)	315.6	(81485)	92	(23789)
Drag Strut	36.83	308.1	11349	88	3247
Side Strut	10.10	312.6	3157	87	879
Vee Brace	15.09	287.7	4342	86	1304
Shock Strut	79.14	327.9	25946	92	7285

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
ALIGHTING GEAR GROUP (Cont'd.) (Retracted Position)					
Main Gear (Cont'd.)					
Structure (Cont'd.)					
Insulation - Struts	31.23	310.8	9707	86	2674
Oil - Shock Strut	3.40	332.1	1129	92	313
Torque Arms	5.66	343.3	1943	88	498
Two-Position Linkage	29.43	311.3	916	98	2877
Main Attach Fittings - Body	45.58	311.6	14203	100	4545
Ground Feeler Probe	.62	352.7	219	92	57
Pins, Bolts, Nuts, Etc.	1.15	286.0	329	96	110
Controls	(60.35)	250.8	(15137)	96	(5775)
Retracting	(33.15)	270.0	(8952)	96	(3192)
Electrical Circuitry	4.13	236.2	975	100	413
Electrical Controls	1.04	110.1	115	114	119
Hydraulic Operating Mech.	(13.11)	304.0	(3986)	92	(1207)
Plumbing	3.97	305.3	1212	95	377
Selector Valves	1.36	292.0	397	94	128
Sequence Valves	.68	305.0	207	93	63
Actuator	7.06	305.7	2158	90	635
Fluid	.04	296.0	12	98	4
Uplatch Operating Mech.	(9.60)	328.6	(3155)	94	(903)
Actuator	.97	329.0	319	91	88
Mechanism	8.63	328.7	2836	94	815
Position Indicating Mech.	5.10	131.5	670	105	534
Supports - Body	.17	298.2	51	96	16
Brake Operating	(10.78)	159.2	(1716)	103	(1115)
Mechanical Controls	2.40	98.2	236	106	255
Hydraulic Plumbing	6.84	191.8	1312	101	691
Supports - Body	1.30	95.1	124	113	147
Hydraulic Fluid	.24	185.0	44	90	22
Emergency Extension	(5.84)	217.5	(1270)	93	(543)
Electrical Circuitry	.24	127.7	31	94	23
Pneumatic Operating Mech.	(5.15)	229.1	(1180)	93	(480)
Controls	1.65	128.1	211	95	157
Plumbing	3.50	276.7	969	92	323

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)ALIGHTING GEAR GROUP (Cont'd.)
(Retracted Position)

Main Gear (Cont'd.)

Controls (Cont'd.)

Emergency Extension (Cont'd.)

Supports - Body

Two Positioning Controls

Electrical Circuitry

Plumbing

Selector Valve

Actuator

Supports - Body

Hydraulic Fluid

Nose Gear

Running Gear

Wheel (1)

Tire, 18 x 4.4

Structure

Shock Strut, Oil & Damper

Drag Strut

Main Attach Fittings - Body

Controls

Retracting

Electrical Circuitry

Hydraulic Operating Mech.

Plumbing

Fluid

Actuator

Position Indicating Mech.

Supports - Body

Emergency Extension

WEIGHT	HORIZONTAL		VERTICAL	
	ARM	MOMENT	ARM	MOMENT
.45	131.4	59	88	40
(10.58)	302.4	(3199)	87	(925)
1.13	222.7	252	98	111
.48	319.0	153	87	42
1.34	322.0	431	91	122
7.40	309.4	2290	85	629
.15	323.0	48	93	14
.08	316.0	25	84	7
(82.29)	115.5	(9504)	81	(6636)
(20.17)	99.2	(2001)	83	(1674)
9.22	99.2	915	83	765
10.95	99.2	1086	83	909
(55.31)	120.5	(6665)	79	(4371)
44.23	120.3	5321	78	3450
7.14	120.9	863	86	612
3.94	122.1	481	78	309
(6.81)	123.0	(838)	87	(591)
(6.27)	123.6	(775)	87	(543)
.77	130.6	101	87	67
(5.09)	122.6	(624)	86	(437)
2.81	121.4	341	84	237
.10	125.0	12	85	8
2.18	124.1	271	88	192
.32	122.8	39	97	31
.09	121.7	11	86	8
(.54)	116.7	(63)	89	(48)

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)ALIGHTING GEAR GROUP (Cont'd.)
(Retracted Position)

Nose Gear (Cont'd.)

Controls (Cont'd.)

Emergency Extension (Cont'd.)

Electrical Circuitry
Pneumatic Plumbing

SURFACE CONTROLS

Cockpit Controls

Control Column
Control Column Conn. Members
Rudder Pedals
Rudder Pedal Supports
Rudder Pedal Adjust Mech.
Lift Stick
Lift Stick Mechanism

Auto-Stabilization

Auto Stabilization Controller
Electrical Circuitry

System Controls - Conventional

Aileron

Mechanical Controls
Electrical Circuitry
Trim Controls
Hydraulic Operating Mech.
Plumbing
Fluid
ActuatorsAileron Droop System
Mechanical Controls
Electric Actuator
Electric CircuitrySupports - Wing
Supports - Body

WEIGHT	HORIZONTAL		VERTICAL	
	ARM	MOMENT	ARM	MOMENT
.26	116.4	30	94	24
.28	117.0	33	86	24
(440.20)	233.0	(102549)	104	(45827)
(24.45)	117.5	(2872)	101	(2462)
3.67	117.7	432	109	399
6.79	123.6	839	88	600
6.44	101.8	656	108	697
.57	118.2	67	96	55
1.35	101.2	137	108	146
5.25	130.7	686	101	530
.38	144.0	55	92	35
(40.72)	155.7	(6341)	100	(4088)
29.79	149.5	4455	101	3008
10.93	172.6	1886	99	1080
(137.15)	318.0	(43614)	118	(16148)
(41.31)	248.8	(10279)	99	(4105)
(18.88	228.1	4306	99	1867
.40	252.6	101	102	41
1.58	307.8	486	104	164
(12.06)	298.5	(3600)	99	(1197)
5.37	300.0	1611	98	528
.39	300.0	117	99	39
6.30	297.2	1872	100	630
(4.93)	192.1	(947)	100	(494)
3.37	193.5	652	100	336
1.24	198.0	246	101	125
.32	154.1	49	104	33
2.73	255.7	698	100	272
.73	193.3	141	96	70

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL		
		ARM	MOMENT	ARM	MOMENT	
SURFACE CONTROLS (Cont'd.)						
System Controls-Conventional (Cont'd.)						
Elevator	(21.13)	294.5	(6222)	119	(2512)	
Mechanical Controls	12.86	352.6	4534	135	1737	
Tension Regulator	4.20	159.2	669	86	361	
Supports - Body	4.07	250.4	1019	102	414	
Rudder	(19.54)	302.4	(5908)	106	(2068)	
Mechanical Controls	10.16	204.9	2082	98	991	
Tension Regulator	4.12	494.9	2039	117	482	
Electrical Circuitry	.75	264.5	198	120	90	
Trim Controls	1.57	470.4	739	127	200	
Supports - Body	2.94	289.3	850	104	305	
Flaps	(15.70)	311.1	(4883)	100	(1577)	
Electrical Circuitry	2.81	259.9	730	103	290	
Electric Actuator	11.72	321.5	3768	100	1172	
Supports - Body	1.17	329.3	385	99	115	
Horizontal Stabilizer	(39.47)	413.5	(16322)	149	(5886)	
Electrical Circuitry	6.21	278.1	1727	116	723	
Trim Controls - Electrical	1.75	359.6	629	90	158	
Hydraulic Actuating Mech.	(31.51)	443.2	(13966)	159	(5005)	
Plumbing	14.89	410.5	6113	125	1858	
Fluid	1.63	404.7	660	121	197	
Actuator	14.47	480.9	6959	198	2864	
Supports - Tail	.40	471.4	189	187	75	
Supports - Body	.12	374.5	45	89	11	
System Controls - VTOL	(237.88)	209.0	(49722)	97	(23129)	
Pitch System	(38.24)	114.3	(4372)	91	(3476)	
Mechanical Controls	13.41	149.6	2005	87	1171	
Electrical Operating Mech.	(5.14)	95.3	(490)	103	(528)	
Controls	3.70	59.0	218	104	385	
Circuitry	.63	146.0	92	98	62	
Trim Controls	.81	222.0	180	100	81	

WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL		
		ARM	MOMENT	ARM	MOMENT	
SURFACE CONTROLS (Cont'd.)						
System Controls - VTOL (Cont'd.)						
Pitch System (Cont'd.)						
Hydraulic Operating Mech.	(19.69)	95.3	(1877)	90	(1777)	
Plumbing	5.91	111.3	657	95	561	
Fluid	.81	111.7	90	93	75	
Actuators	9.60	88.0	845	87	835	
Supports - Body	3.37	84.7	285	91	306	
Yaw System	(2.55)	197.3	(504)	99	(252)	
Mechanical Controls	1.26	190.3	240	97	122	
Electrical Circuitry	.32	162.1	52	104	33	
Trim Controls - Elect.	.97	218.1	212	100	97	
Roll System	(1.52)	213.2	(324)	100	(153)	
Mechanical Controls	.40	206.0	82	99	40	
Electrical Circuitry	.26	167.6	44	100	26	
Trim Controls - Electrical	.86	230.3	198	101	87	
Lift System	(110.62)	248.2	(27451)	97	(10683)	
Mechanical Controls	13.38	227.4	3042	96	1289	
Electrical Circuitry	.58	166.5	97	99	58	
Thrust Vector Actuator	2.74	220.5	604	100	274	
Hydraulic Operating Mech.	(93.92)	252.4	(23708)	96	(9062)	
Plumbing	8.36	224.6	1877	99	830	
Fluid	.87	207.1	180	99	87	
Servo Actuator	53.56	257.3	13780	97	5195	
Supports - Wing	31.05	252.9	7854	95	2942	
Supports - Body	.08	216.2	17	97	8	
Common To All Systems	(84.95)	201.0	(17071)	101	(8565)	
Mechanical Mixer	34.54	227.7	7865	100	3446	
Electrical Circuitry	8.20	170.5	1398	106	871	
Circuitry Interlock	14.68	241.7	3548	112	1640	
Electrical Mixer	27.09	154.8	4192	95	2568	
Supports - Body	.44	155.4	68	91	40	

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
ENGINE SECTION	(44.55)	250.0	(11138)	139	(6174)
Engine Mounts	14.34	251.6	3608	140	2007
Firewall	30.21	249.3	7530	138	4167
PROPELLSION GROUP	(3676.34)	234.7	(863513)	116	(425248)
Main Propulsion - Gas Generator	(1257.92)	242.0	(304007)	142	(179504)
Engine - G.E. J85-GE-5B (2)	935.90	225.0	210577	147	137577
Accessory Gear Box & Drive	(28.24)	195.8	(5528)	137	(3864)
Gear Box	19.60	192.4	3770	137	2680
Flex Shaft - Accessory Drive	8.64	203.5	1758	137	1184
Air Induction System	(63.01)	187.6	(11820)	147	(9247)
Air Intake Duct	60.08	186.5	11202	147	8805
Compressor Bleed Duct	2.93	211.1	618	151	442
Exhaust System	(220.47)	333.9	(73619)	124	(27271)
Tailpipe	148.93	322.6	48049	128	19102
Tailpipe Shroud & Insulation	58.23	344.3	20047	119	6930
Supports	.30	287.0	86	134	40
Thrust Spoiler Doors	7.57	418.1	3165	92	696
Thrust Spoiler Linkage	5.44	417.6	2272	92	503
Cooling System	(10.30)	239.1	(2463)	150	(1545)
Ejector	10.30	239.1	2463	150	1545
Main Propulsion - Lift Fan	(1905.74)	255.8	(487475)	102	(194100)
Lift Fan - G.E. X353-5B (2)	1765.74	256.0	452029	101	178339
Fan Mounts	8.06	244.8	1973	104	838
Air Induction System	(131.94)	253.7	(33473)	113	(14923)
Crossover Ducting	100.28	253.5	25423	112	11194
Duct Insulation	16.63	256.0	4257	120	1996
Duct Supports	15.03	252.3	3793	115	1733
Auxiliary Propulsion - Pitch Fan	(337.18)	91.9	(31004)	93	(31492)
Pitch Fan - G.E. X376 (1)	114.15	61.2	6986	100	11415
Fan Mounts	2.27	79.1	179	101	229

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WEIGHT EMPTY - WEIGHT AND BALANCE DETAILS (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
PROPELLION GROUP (Cont'd.)					
Auxiliary Propulsion-Pitch Fan (Cont'd.)					
Air Induction System	(136.39)	138.1	(13842)	93	(12731)
Air Ducts	61.54	168.0	10340	86	5320
Duct Supports	5.74	171.1	982	89	514
Duct Shrouding	30.12	167.5	5046	85	2558
Intake Bellmouth	20.40	62.1	1266	111	2260
Intake Louvres	18.59	65.0	1208	112	2079
Exhaust System	(84.37)	59.2	(4997)	84	(7117)
Pitch Thrust Reverser	75.57	56.3	4252	84	6373
Thrust Reverser Linkage	8.80	84.7	745	85	744
Lubricating & Fuel System	(124.39)	240.5	(29917)	117	(14561)
Main Fuel System	(122.20)	240.6	(29406)	117	(14307)
Forward Tank (246 gal.)	18.88	187.4	3539	112	2114
Aft Tank (126 gal.)	34.54	297.7	10284	118	4091
Backing Board - Fwd. Tank	8.85	188.7	1670	111	982
Tank Supports	2.80	299.4	838	113	316
Boost Pumps & Elect. Controls	14.22	220.6	5137	110	1563
Ground Filling System	4.33	214.8	930	130	564
Engine Drain System	10.10	219.8	2219	109	1101
Distribution System	20.59	219.6	4522	123	2537
Vent System	5.85	323.2	1891	138	808
Low Pressure Warning System	1.84	191.7	353	114	209
Fuel Valve Position Indicator	.20	113.0	23	110	22
Auxiliary Fuel System	(2.19)	233.2	(511)	116	(254)
Tank Supports	2.19	233.2	511	116	254
Cool System - Integral With Engine					
Engine Controls	(42.90)	215.9	(9261)	109	(4685)
Ignition	.68	157.8	107	117	80
Throttle	19.74	145.8	2877	106	2102
Diverter Valve	13.91	216.9	3017	125	1738
Thrust Spoiler	8.57	380.4	3260	89	765
Starting System - Air Impingement	8.21	225.2	1849	110	906

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	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
INSTRUMENTS	(73.08)	165.2	(11930)	120	(8776)
Accelerometer	.66	106.0	70	121	80
Machmeter	(2.04)	115.7	(236)	121	(247)
Indicator	1.65	105.2	174	124	204
Wiring	.39	158.4	62	111	43
Altimeter	1.31	105.0	138	124	162
Attitude	(3.07)	106.2	(326)	121	(370)
Indicator	2.86	106.0	303	121	346
Wiring	.21	110.5	23	115	24
Airspeed - Low Speed	.60	105.0	63	124	74
Rate of Climb Indicator	1.46	105.0	153	123	180
Landing Gear Warning Indicator	.05	110.0	5	116	6
Turn and Bank	(1.31)	109.2	(143)	115	(150)
Indicator	1.20	109.0	131	115	138
Wiring	.11	111.9	12	112	12
Flap - Thrust Spoiler Position	(2.31)	217.7	(503)	108	(249)
Indicator	.57	107.5	61	120	68
Transmitter	.10	410.0	41	100	10
Wiring	1.64	244.5	401	104	171
Standby Compass	(.93)	106.9	(99)	129	(120)
Indicator	.72	107.0	77	129	93
Installation	.21	104.5	22	129	27
Landing Gear Position.	(1.75)	167.4	(293)	103	(180)
Indicator	.32	110.5	35	112	36
Wiring	1.43	180.6	258	101	144
Fuel Quantity	(7.97)	196.9	(1569)	119	(946)
Indicator	1.82	140.5	256	116	211
Transmitters	3.77	228.0	860	117	442
Wiring	2.38	190.5	453	123	293
Fuel Flow	(9.44)	175.1	(1653)	130	(1230)
Indicator	1.40	108.5	152	120	168
Transmitters	4.90	196.0	960	132	647
Wiring	3.14	172.3	541	132	415
Oil Pressure	(7.07)	198.3	(1402)	134	(950)
Indicator	.63	109.5	69	118	74
Transmitters	2.70	232.0	626	144	389
Wiring	3.74	189.0	707	130	487
Engine Tachometers (2)	(2.06)	137.9	(284)	129	(265)
Indicators	.98	108.5	106	124	122
Wiring	1.08	164.6	178	132	143
Hydraulic Pressure	(5.06)	145.8	(738)	127	(642)
Indicator	.87	120.4	105	123	107
Transmitter	3.00	156.5	470	131	393
Wiring	1.19	137.1	163	120	142
Pitot System	9.82	186.9	1836	103	1015
Clock	.43	109.5	47	115	49

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INSTRUMENTS (Cont'd.)	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
Alpha Meter - Angle of Attack	.63	108.5	68	118	74
Angle of Yaw	.63	108.5	68	118	74
Vector Angle	.26	107.0	28	120	31
Exhaust Temperature	(3.73)	153.1	(571)	123	(457)
Indicator - Dual	1.35	108.5	146	122	165
Wiring	2.38	178.7	425	123	292
Rudder, Aileron, Stab. Position	(4.13)	211.1	(872)	118	(488)
Indicator	1.11	108.5	120	115	128
Wiring	5.02	249.2	752	119	360
Louver Position	(1.27)	107.9	(137)	115	(147)
Indicator	1.11	108.5	120	115	128
Wiring	.16	109.0	17	118	19
Master Caution Panel	(2.90)	132.4	(384)	117	(338)
Indicator	.13	108.5	14	122	16
Panel	1.41	109.0	154	121	171
Wiring	1.36	158.5	216	111	151
Console Vibrator	.90	111.0	100	120	108
Attaching Hardware	.58	109.0	63	118	68
Switches, Etc.	.71	114.0	81	110	78
HYDRAULIC AND PNEUMATIC GROUP	(115.43)	183.5	(21155)	123	(14158)
Hydraulic Utility System	(113.47)	183.5	(20819)	123	(13982)
Pumps, Engine Driven (2)	14.32	174.8	2503	140	2005
Oil Coolers (2)	6.10	176.2	1075	135	823
Reservoirs (2)	14.30	165.1	2361	128	1830
Accumulators (2)	7.43	171.4	1274	127	944
Accumulator Charge Fittings	.80	171.2	137	129	103
Filters	6.64	168.0	1116	135	894
Pressure Switch	.74	159.9	118	128	95
Valves	(3.23)	171.8	(559)	128	(412)
Check	.10	177.7	28	140	22
Relief	2.92	171.5	501	127	371
Control	.15	171.4	26	127	19
Temperature Indication	.94	149.9	141	145	136
Low Pressure Warning	.38	143.4	54	123	47
Quick Disconnects	1.04	157.5	164	124	129
Plumbing	25.39	202.1	5131	114	2904
Fluid in System	25.62	203.1	5203	113	2898
Supports - Body	6.54	151.1	987	116	762
Pneumatic Emergency System	(1.96)	170.6	(334)	90	(176)
Plumbing	1.96	170.6	334	90	176

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	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
ELECTRICAL GROUP	(195.57)	253.4	(49552)	117	(22962)
A.C. System	(5.82)	326.1	(1898)	109	(635)
Power Conversion Transformer	(.81) .81	146.5 146.5	(119) 119	102 102	(83) 83
Distribution & Controls Relays Wiring Conduit	(3.90) 2.28 .86 .76	380.8 458.1 300.8 240.0	(1485) 1044 259 182	112 117 107 103	(437) 267 92 78
Lights & Signals Wiring for Exterior Lights	(1.11) 1.11	265.2 265.2	(294) 294	104 104	(115) 115
D.C. System	(189.75)	251.1	(47654)	118	(22327)
Power Supply Generators 165 AMP (2) Battery (1) Battery Supports	(92.96) 74.00 18.00 .96	243.5 185.0 471.7 471.8	(22634) 13690 8491 453	133 139 111 109	(12388) 10286 1998 104
Power Conversion Static Inverter (2) Wiring	(28.44) 24.06 4.38	432.4 455.7 304.3	(12297) 10964 1333	110 110 108	(3119) 2647 472
Distribution & Controls Generator Controls Volt-Ammeter Switches, Rheostats & Panels Circuit Breaker & Fuses Junction Fuse & Dist. Boxes Receptacles & Connectors Relays Wiring Conduit Bonding Installations	(61.63) 13.24 1.06 .27 10.06 2.23 1.84 7.11 23.47 1.87 .48	183.6 150.2 120.0 120.0 132.3 152.0 156.4 199.2 220.2 251.9 318.5	(11313) 1988 127 32 1331 339 288 1416 5168 471 153	100 93 100 100 94 96 88 103 105 108 106	(6143) 1232 106 27 946 213 162 735 2468 203 51
Equipment Supports Distribution Box Equipment Supports - Wing Equipment Supports - Body	(6.72) 2.00 1.08 3.64	209.8 149.6 204.7 244.5	(1410) 299 221 890	101 102 101 100	(677) 204 109 364

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	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
ELECTRONICS	(39.64)	155.3	(6075)	95	(5765)
UHF Transceiver, ARC-51X	(39.64)	155.3	(6075)	95	(5765)
Equipment	(38.02)	155.1	(5820)	95	(5626)
Transceiver	(30.30)	158.5	(4803)	95	(2877)
Radio, RT-702/ARC-51X	27.90	158.5	4422	95	2650
Mount, MT-2653	.40	158.5	63	92	37
Cooler, HD-615/ARC-51X	1.00	158.5	159	95	95
Indicator, ID-1003/ARC-51X	1.00	158.5	159	95	95
Antenna, AT256A/ARC	1.54	162.0	249	66	102
Control Unit C3984/ARC-51	3.00	110.0	330	115	345
Cabling	3.18	157.8	438	95	502
Installation	(1.62)	157.9	(255)	84	(137)
Transceiver	.94	155.8	146	92	87
Antenna	.68	161.0	109	73	50
FURNISHINGS AND EQUIPMENT	(212.95)	152.0	(32641)	112	(23953)
Accommodations for Personnel	(166.52)	142.1	(23715)	112	(18676)
Pilot's Seat-North American LW-2	(148.80)	141.4	(21067)	112	(16694)
Seat 9142-53009	116.50	140.0	16310	111	12931
Seat Adjusting Mechanism	5.96	152.0	906	130	775
Bulkhead Fittings (2)	3.10	145.5	451	106	329
Speed Sensor	.69	149.0	103	111	77
Rocket Catapult	21.75	147.0	3197	115	2501
Initiators T-30E2 (2)	.70	122.0	85	100	70
Cartridges (4)	.10	147.0	15	106	11
Seat Tracks & Supports	17.72	149.5	2648	112	1982
Miscellaneous Equipment	(12.06)	110.6	(1334)	111	(1334)
Instrument Panel	4.91	105.5	518	120	591
Instrument Panel Supports	1.54	106.5	164	115	178
Consoles	5.61	116.2	652	101	565

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FURNISHINGS AND EQUIPMENT (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
Emergency Equipment	(34.37)	220.9	(7592)	115	(3943)
Fire Extinguishing System	(20.74)	223.8	(4642)	114	(2369)
Bottles (Including Charge)	12.44	219.0	2724	112	1393
Controls	3.17	245.6	779	115	364
Plumbing	4.93	222.4	1096	119	589
Bottle Supports	.20	216.5	43	114	23
Fire Detection System	9.36	210.2	1967	121	1150
Structure Overheat Warning	4.27	230.2	983	104	444
AIR CONDITIONING & ANTI-ICING					
Air Conditioning System	(34.27)	192.6	(6002)	137	(4690)
Cooling System	(33.15)	192.6	(6384)	137	(4542)
Fans (2)	13.53	192.0	2598	137	1854
Ducting	14.42	195.7	2822	137	1983
Plenum Chamber	4.99	184.1	919	136	677
Supports - Body	.21	212.7	45	132	28
Anti-Icing	(1.12)	194.4	(218)	132	(148)
Engine Anti-Icing Wiring	1.12	194.4	218	132	148
AUXILIARY GEAR	(27.39)	448.1	(12273)	106	(2916)
Handling	(.66)	378.7	(250)	87	(58)
Jacking Fittings	.49	386.6	189	87	43
Leveling Fittings	.17	355.9	61	87	15
Arresting Gear	(26.73)	450.0	(12023)	107	(2858)
Decelerating Parachute	13.60	500.0	6800	110	1496
Chute Container & Fittings	5.37	485.0	2604	108	579
Chute Controls	7.76	337.5	2619	101	781

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2.7 Instrumentation

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INSTRUMENTATION

ITEM	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
Nose Boom	5.60	- 1.91	- 11	94	526
Fan Overspeed Control	8.32	121.91	1014	106	880
Circuitry Fan Bearing Heat	5.31	163.80	870	95	504
Circuitry Fan RPM & Limit	10.71	159.75	1711	94	1011
Auto Stab. System Instrumentation	1.70	109.00	185	112	190
G.E. Fan Slip Rings (2)	21.08	204.25	4306	101	2123
Tubing for Static Test Wiring	.28	212.86	60	102	29
D020 Signal Access & Harn. Standoffs	2.03	242.00	491	120	244
D021 Oat Probe Installation	1.16	256.03	297	104	120
D022 Probe - Nose, Yaw & Angle	2.38	- 67.60	- 161	95	226
D023 Temp. Measurement Instl.	10.02	196.70	1971	121	1212
D025 Probe - Hyd. Temp.	.54	165.00	89	128	69
D026 Transducer Installation	1.39	1.44	2	95	132
D027 Pos. Potentiometer	.24	495.83	119	113	27
D028 Pos. Potentiometer-Rudder	.15	437.00	73	115	17
D029 Pos. Potentiometer-Aileron	.45	299.00	135	104	47
D030 Force Transducers	.09	122.22	11	100	9
D031 Pos. Potentiometer-Aileron Tab	.07	317.70	22	102	7
D033 Pot.-Fwd.Louvre Servo-Fan Exit	.42	211.00	89	97	41
D034 Pot.-Aft Louvre Servo-Fan Exit	.42	300.00	126	97	41
D035 Photo Recorder Installation	2.25	104.00	234	99	223
D036 Pot.-Pitch Fan Exit Door	.22	88.00	19	87	19
D037 Pos. Potentiometer-Rudder Hirge	.11	513.00	56	183	20
D039 Potentiometer-Stick-Long & Lat.	.45	113.33	51	87	39
D040 Potentiometer-Rudder Pedal	.28	94.00	26	110	31
D041 Post.-Potentiometer-Control Col.	.29	138.00	40	86	25
D044 C.G. Accel. Mtng. Box	9.54	241.71	2306	121	1159
D045 Accels. - Wing & Tail	1.40	380.00	532	141	198
D047 Inverter Elapsed Time	.23	455.00	105	113	26
D049 Equip.-Data Acquisition					
PCM Package	72.78	143.50	10444	107	7787
Vertical Gyro	5.00	115.00	575	96	480
Analog Record Electronics	10.00	99.00	990	95	950
Tape Transport	25.00	98.70	2467	94	2350
Telemetry Package	18.70	135.60	2536	102	1907
D050 Signal Conditioner	46.90	128.70	6036	105	4925
Temp. Syst. Instl. Box	39.30	137.00	5384	96	3773
-3 Fwd. Mounting Board	11.00	108.00	1188	93	1023
-5 Aft Mounting Board	5.40	130.00	702	94	508
D051 Antenna-Telemetry	2.71	177.50	481	134	363
D054 Wiring	123.38	208.12	25678	104	12832
D057 Press. Probes - Cooling Syst.	11.91	202.30	2409	112	1334
D058 Pos. Potentiometer-Elevator	.09	518.00	47	206	19

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INSTRUMENTATION (Cont'd.)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
Tape Remaining Indicator	1.50	110.00	165	115	173
Correlation Counter	3.30	131.00	432	109	360
Engine Parameters	13.65	190.80	2604	148	2020
Wheel Contact Indicator	.80	125.00	100	90	72
Ballast Bracket	2.70	481.00	1299	95	257
Nickel-Cadmium Battery	15.00	128.00	1920	90	1350
Position Pot.-Flap	2.50	275.00	688	105	263
Position Pot.-Wing Fan Louvres	4.00	200.00	800	105	420
NEFF Power Supply	9.00	135.00	1215	95	855
Boom-Stab. Angle of Attack	3.25	475.00	1544	96	312
TOTAL-INSTRUMENTATION	515.00	162.03	84472	104	53528

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2.8 Moment Change-Landing Gear Extended

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		HORIZONTAL		VERTICAL	
	WEIGHT	ARM	MOMENT	ARM	MOMENT
LANDING GEAR RETRACTED (As Reflected in this Report)	(353.76)	281.0	(99401)	88	(31188)
Main Gear	(276.54)	(327.2)	(90491)	(90)	(24999)
Shock Strut, Oil & Axle	88.20	329.0	29019	92	8096
Drag Brace	30.28	311.2	9424	88	2657
Side Brace	10.10	312.6	3157	87	879
Vee Brace & Positioning Mechanism	25.57	293.4	7503	91	2320
Retracting Cylinder	7.06	305.7	2158	90	635
Wheels	28.90	352.7	10193	92	2659
Brakes	28.38	352.7	10010	92	2611
Tires	23.70	352.7	8359	92	2180
Hydraulic Hoses, Brackets, etc.	3.12	308.0	961	92	288
Insulation	31.23	310.8	9707	86	2674
Nose Gear	(77.22)	(115.4)	(8910)	(80)	(6189)
Shock Strut, Oil & Shimmy Damper	44.23	120.3	5321	78	3450
Braces & Jury Links	8.41	122.2	1028	85	712
Retracting Cylinder	2.18	124.1	271	88	192
Wheel	9.22	99.2	915	83	765
Tire	10.95	99.2	1086	83	909
Aft Door	2.23	129.6	289	72	161

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MOMENT CHANGE - LANDING GEAR EXTENSION
(Retractable Items Only)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
LANDING GEAR EXTENDED <u>VTOL</u> (Vertical Take-off Position)	(353.76)	261.6	(92551)	60	(21124)
Main Gear	(276.54)	(297.4)	(82232)	(61)	(16782)
Shock Strut, Oil & Axle	88.20	292.4	25786	58	5081
Drag Brace	30.28	306.0	9266	75	2274
Side Brace	10.10	292.2	2951	63	636
Vee Brace	25.57	293.4	7503	91	2320
Retracting Cylinder	7.06	318.0	2245	91	642
Wheels	28.90	296.0	8554	42	1214
Brakes	28.38	296.0	8696	42	1234
Tires	23.70	296.0	7015	42	995
Hydraulic Hoses, Brackets, etc.	3.12	290.4	906	76	236
Insulation	31.23	291.1	9310	69	2150
Nose Gear	(77.22)	(133.6)	(10319)	(56)	(4342)
Shock Strut, Oil & Shimmy Damper	44.23	135.8	6006	58	2565
Braces & Jury Links	8.41	119.6	1006	76	642
Retracting Cylinder	2.18	117.1	255	78	170
Wheel	9.22	135.6	1250	41	378
Tire	10.95	135.6	1485	41	449
Aft Door	2.23	142.0	317	62	138

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MOMENT CHANGE - LANDING GEAR EXTENSION
(Retractable Items Only)

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
LANDING GEAR EXTENDED <u>CTOL</u> (Conventional Take-off Position)	(353.76)	251.0	(88782)	59	(20742)
Main Gear	(276.54)	(283.7)	(78463)	(59)	(16400)
Shock Strut, Oil & Axle	88.20	278.3	24544	58	5081
Drag Brace	30.28	297.1	8997	70	2106
Side Brace	10.10	280.0	2828	63	636
Vee Erace	25.57	291.1	7444	88	2261
Retracting Cylinder	7.06	305.4	2156	85	600
Wheels	28.90	276.0	7976	42	1214
Brakes	29.38	276.0	8109	42	1234
Tires	23.70	276.0	6541	42	995
Hydraulic Hoses, Brackets, etc.	3.12	283.0	883	76	236
Insulation	31.23	287.7	8985	65	2037
Nose Gear - Same as VTOL	(77.22)	133.6	(10319)	56	(4342)

SUMMARY - MOMENT CHANGE

RETRACTED TO VTOL Retracted Main and Nose VTOL Main and Nose	99401		31188
	92551		21124
MOMENT CHANGE: RETRACTED TO VTOL	-6850		-10064
RETRACTED TO CTOL Retracted Main and Nose CTOL Main and Nose	99401		31188
	88782		20742
MOMENT CHANGE: RETRACTED TO CTOL	-10619		-10446
VTOL Position	92551		21124
CTOL Position	88782		20742
△ MOMENT CHANGE: VTOL TO CTOL	-3769		- 382

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2.9 Fuel Center of Gravity Graphs

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FUEL CENTER OF GRAVITY TRAVEL
FORWARD MAIN TANK

WATERLINE - INCHES

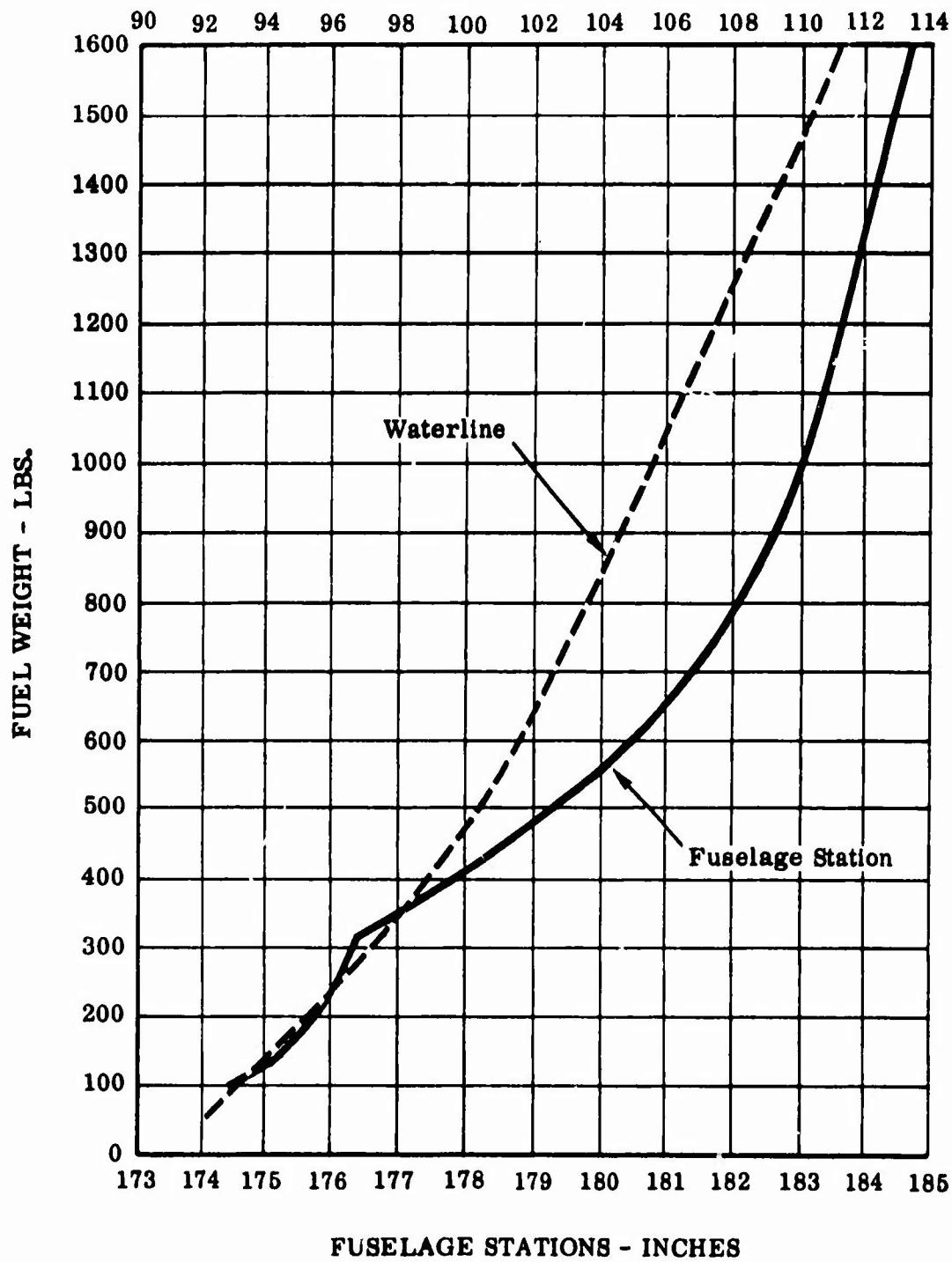


Figure 3

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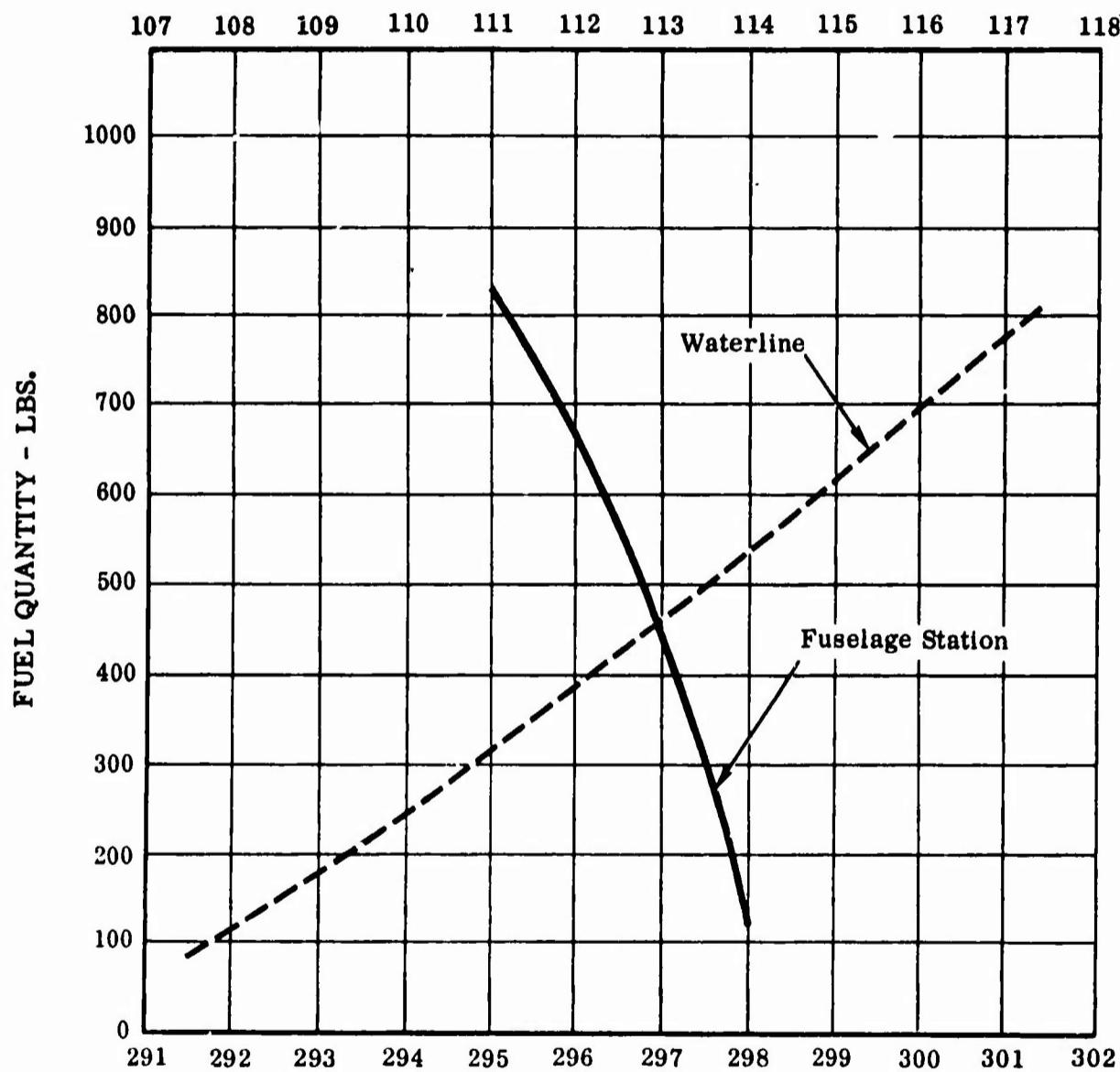
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**FUEL CENTER OF GRAVITY TRAVEL
AFT MAIN TANK**

WATERLINE - INCHES



FUSELAGE STATION - INCHES

Figure 4

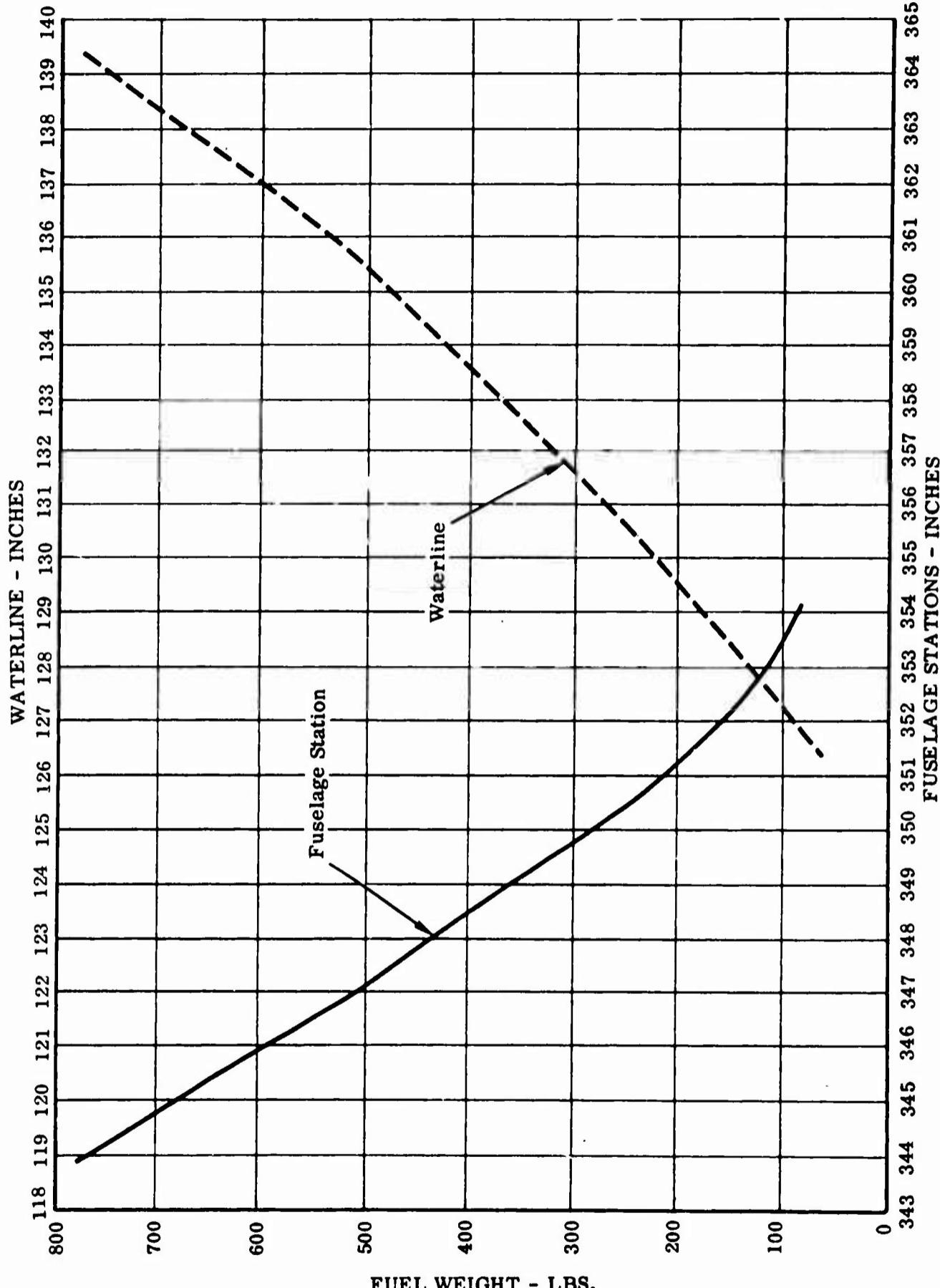
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FUEL CENTER OF GRAVITY TRAVEL
DORSAL AUXILIARY FUEL TANK



FUEL WEIGHT - LBS.

Figure 5

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2.10 Gross Weight Balance Calculations

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GROSS WEIGHT 9200 LBS. - NO INSTRUMENTATION

WEIGHT	HORIZONTAL		VERTICAL	
	ARM	MOMENT	ARM	MOMENT
WEIGHT EMPTY (Gear Up)				
Crew	8063	248.4	2002587	113 911119
Fuel - Unusable - Fwd.	200	137	27400	111 22200
Fuel - Unusable - Aft	4	180	720	92 368
Oil - Trapped	22	299	6578	105 2310
Oil - Engine	3	204	612	136 408
Auxiliary Oxygen System	12	204	2448	136 1632
Emergency Escape Axe	19	147	2793	100 1900
Usable Fuel	2	140	280	108 216
Forward Main Tank	438	178.4	78139	99 43362
Aft Main Tank	437	297.0	129789	113 49381
GROSS WEIGHT - 9200 Lbs. (Gear Up)	9200	245.0	2251346	111 1032896
$\frac{245.0 - 211.14}{112.92} =$	30.0%	M.A.C.		
Extend Gear to VTOL Position			- 6850	- 10064
GROSS WEIGHT - 9200 Lbs. - VTOL	9200	244.2	2244496	110 1022832
$\frac{244.2 - 211.14}{112.92} =$	29.3%	M.A.C.		
△ Change - Gear VTOL to CTOL			- 3769	- 382
GROSS WEIGHT - 9200 Lbs. - CTOL	9200	243.8	2240727	110 1022450
$\frac{243.8 - 211.14}{112.92} =$	26.9%	M.A.C.		

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GROSS WEIGHT 9200 LBS. - INCLUDING INSTRUMENTATION

WEIGHT	HORIZONTAL		VERTICAL	
	ARM	MOMENT	ARM	MOMENT
WEIGHT EMPTY (Gear Up)				
Crew	8063	248.4	2002587	113 911119
Fuel - Unusable - Fwd.	200	137	27400	111 22200
Fuel - Unusable - Aft	4	180	720	92 368
Oil - Trapped	22	299	6578	105 2310
Oil - Engine	3	204	612	136 408
Auxiliary Oxygen System	12	204	2448	136 1632
Emergency Escape Axe	19	147	2793	100 1900
Instrumentation	2	140	280	108 216
Usable Fuel	515	162	84472	104 53528
Forward Main Tank	180	175.6	31608	95 17100
Aft Main Tank	180	297.8	53604	109 19620
GROSS WEIGHT - 9200 Lbs. (Gear Up)	9200	240.8	2213102	111 1030401
$\frac{240.8 - 211.14}{112.92} =$	26.3%	M.A.C.		
Extend Gear to VTOL Position			- 6850	- 10064
GROSS WEIGHT - 9200 Lbs. - VTOL	9200	240.0	2206352	110 1020337
$\frac{240.0 - 211.14}{112.92} =$	25.6%	M.A.C.		
△ Change - Gear - VTOL to CTOL			- 3769	- 382
GROSS WEIGHT - 9200 Lbs. - CTOL	9200	239.6	2202483	110 1019955
$\frac{239.6 - 211.14}{112.92} =$	25.2%	M.A.C.		

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GROSS WEIGHT - 20 MINUTE MISSION

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
WEIGHT EMPTY (Gear Up)	8063	248.4	2002587	113	911119
Crew	200	137	27400	111	22200
Fuel - Unusable - Fwd.	4	180	720	92	368
Fuel - Unusable - Aft	22	299	6578	105	2310
Oil - Trapped	3	204	612	136	408
Oil - Engine	12	204	2448	136	1632
Auxiliary Oxygen System	19	147	2793	100	1900
Emergency Escape Axe	2	140	280	108	216
Instrumentation	515	162	84472	104	53528
Usable Fuel					
Forward Main Tank	566	180.1	101937	101	57166
Aft Main Tank	566	296.4	167764	114	64524
GROSS WEIGHT - 20 Minute Mission	9972	240.7	2397591	111	1113255
<u>240.7 - 211.14</u> =	112.92	26.2% M.A.C.			
Extend Gear to VTOL Position			- 6850		- 10064
GROSS WEIGHT - 20 Minute - VTOL	9972	239.9	2390741	110	1103191
<u>239.9 - 211.14</u> =	112.92	25.5% M.A.C.			
Δ Change - Gear - VTOL to CTOL			- 3769		- 382
GROSS WEIGHT - 20 Minute - CTOL	9972	239.6	2386972	109	1102809
<u>239.6 - 211.14</u> =	112.92	25.2% M.A.C.			

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GROSS WEIGHT - 45 MINUTE MISSION

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
WEIGHT EMPTY (Gear Up)	8063	248.4	2002587	113	911119
Crew	200	137	27400	111	22200
Fuel - Unusable - Fwd.	4	180	720	92	568
Fuel - Unusable - Aft	22	299	6578	105	2310
Oil - Trapped	3	204	612	136	408
Oil - Engine	12	204	2448	136	1632
Auxiliary Oxygen System	19	147	2793	100	1900
Emergency Escape Axe	2	140	280	108	216
Instrumentation	515	162	84472	104	53528
Usable Fuel					
Forward Main Tank	1017	183.1	186213	106	107802
Aft Main Tank	830	295.0	244850	118	97940
Aft Dorsal Tank	186	351.5	65379	129	23994
GROSS WEIGHT - 45 Minute Mission	10873	241.6	2624332	112	1223417
$\frac{241.6 - 211.14}{112.92} =$	27.0%	M.A.C.			
Extend Gear to VTOL Position			- 6850		- 10064
GROSS WEIGHT - 45 Minute - VTOL	10873	241.0	2617482	111	1213353
$\frac{241.0 - 211.14}{112.92} =$	26.4%	M.A.C.			
Δ Change - Gear - VTOL to CTOL			- 3769		- 382
GROSS WEIGHT - 45 Minute - CTOL	10873	240.6	2613713	111	1213071
$\frac{240.6 - 211.14}{112.92} =$	26.1%	M.A.C.			

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GROSS WEIGHT - FULL FUEL INCLUDING AFT AUXILIARY TANK					
	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
WEIGHT EMPTY (Gear Up)	8063	248.4	2002587	113	911119
Crew	200	137	27400	111	22200
Fuel - Unusable - Fwd.	4	180	720	92	368
Fuel - Unusable - Aft	22	299	6578	105	2310
Fuel - Unusable - Auxiliary	10	360	3600	107	1070
Oil - Trapped	3	204	612	136	408
Oil - Engine	12	204	2448	136	1632
Auxiliary Oxygen System	19	147	2793	100	1900
Emergency Escape Axe	2	140	280	108	216
Instrumentation	515	162	84472	104	53528
Install Auxiliary Fuel Tank	35	339	11865	140	4900
ZERO FUEL - WITH AUX. AFT TANK	8885	241.5	2143355	111	999651
$\frac{241.5 - 211.14}{112.92} =$	26.9%	M.A.C.			
Usable Fuel					
Forward Main Tank - 246 gal.	1600	184.5	295200	111	177600
Aft Main Tank - 128 gal.	830	295.0	244850	118	97940
Aft Auxiliary Tank - 120 l.	780	344.0	268320	139	108420
TOTAL - FULL FUEL (Gear Up)	12095	244.2	2951725	113	1383611
$\frac{244.2 - 211.14}{112.92} =$	29.3%	M.A.C.			
Extend Gear to VTOL Position			- 6850		- 10064
GROSS WEIGHT - FULL FUEL - VTOL	12095	243.7	2944875	113	1373547
$\frac{243.7 - 211.14}{112.92} =$	28.8%	M.A.C.			
△ Change - Gear - VTOL to CTOL			- 3769		- 382
GROSS WEIGHT - FULL FUEL - CTOL	12095	243.3	2941106	113	1373165
$\frac{243.3 - 211.14}{112.92} =$	28.5%	M.A.C.			

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GROSS WEIGHT - EXTENDED RANGE

	WEIGHT	HORIZONTAL		VERTICAL	
		ARM	MOMENT	ARM	MOMENT
WEIGHT EMPTY (Gear Up)	8063	248.4	2002587	113	911119
Crew	200	137	27400	111	22200
Fuel - Unusable - Fwd.	4	180	720	92	368
Fuel - Unusable - Aft	22	299	6578	105	2510
Fuel - Unusable - Auxiliary	10	360	3600	107	4070
Fuel - Unusable - Extended Range	13	236	3068	75	975
Oil - Trapped	3	204	612	136	408
Oil - Engine	12	204	2448	136	1632
Auxiliary Oxygen System	19	147	2793	100	1900
Emergency Escape Axe	2	140	280	108	216
Install Auxiliary Fuel Tank	35	339	11865	140	4900
Install Extended Range Fuel Tank	120	224	26880	83	9960
ZERO FUEL - EXTENDED RANGE	8503	245.9	2088831	111	953967
$\frac{245.9 - 211.14}{112.92} =$	30.8% M.A.C.				
Usable Fuel					
Forward Main Tank - 246 gal.	1600	184.5	295200	111	177600
Aft Main Tank - 128 gal.	830	295.0	244850	118	97940
Aft Auxiliary Tank - 120 gal.	780	344.0	268320	139	108420
Extended Range Tank - 121 gal.	787	224.0	176228	83	65321
TOTAL - EXTENDED RANGE (Gear Up)	12500	246.0	3073429	111	13248
$\frac{246.0 - 211.14}{112.92} =$	30.9% M.A.C.				
Extend Gear to VTOL Position			- 6850		- 10064
GROSS WEIGHT - EXTENDED RANGE - VTOL	12500	245.5	3066579	111	1393180
$\frac{245.5 - 211.14}{112.92} =$	30.0% M.A.C.				
Δ Change - Gear - VTOL to CTOL			- 3769		- 382
GROSS WEIGHT - EXTENDED RANGE - CTOL	12500	245.2	3062810	111	1392802
$\frac{245.2 - 211.14}{112.92} =$	30.2% M.A.C.				

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2.11 Gross Weight Center of Gravity Graph

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CENTER OF GRAVITY TRAVEL

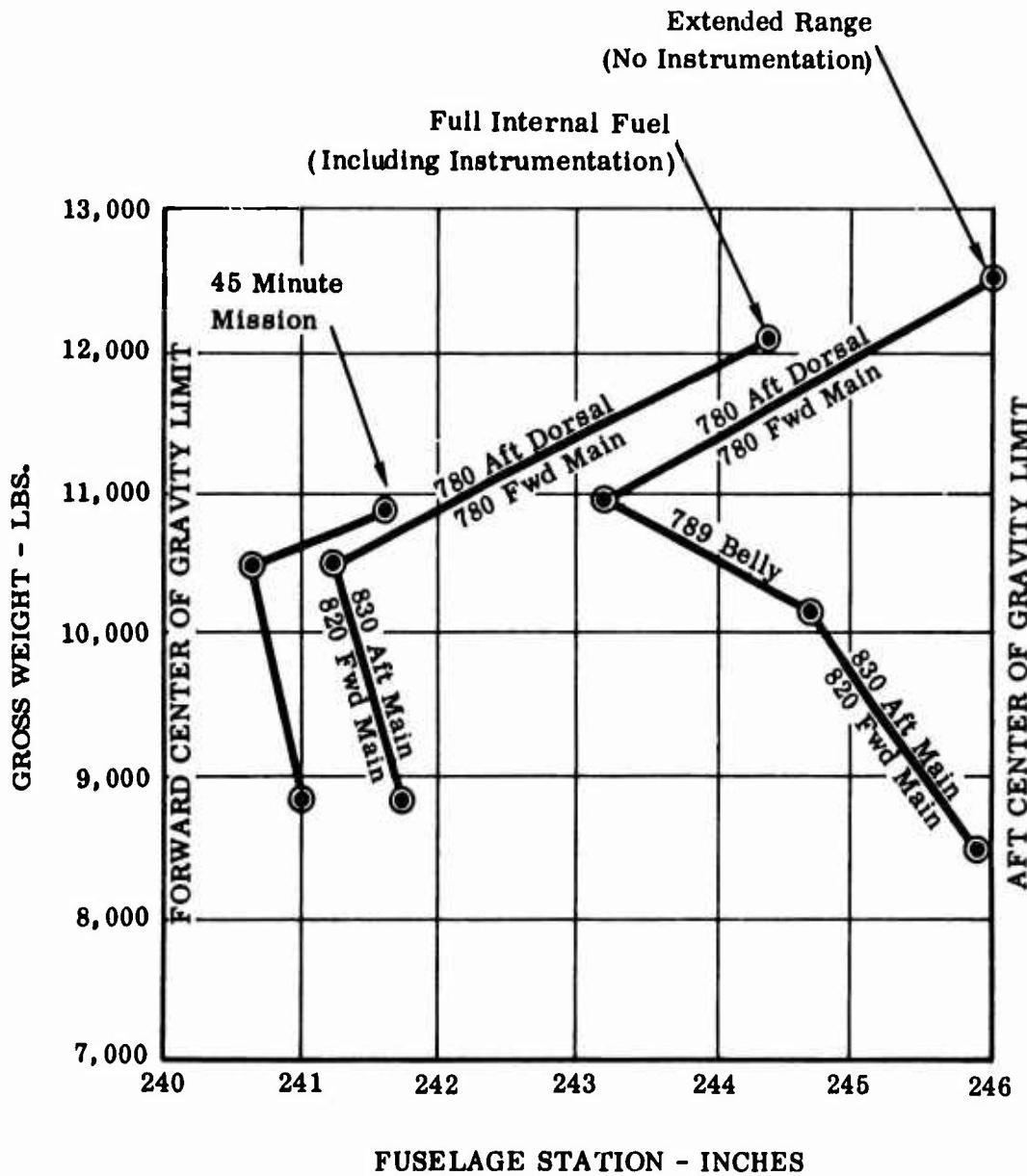


Figure 6

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2.12 Determination of Unusable Fuel

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UNUSABLE FUEL

The unusable fuel was determined at various airplane attitudes by actual measurement. The airplane was positioned at the selected attitude and a measured amount of fuel was introduced into the system. The fuel pumps were turned on and pumped fuel to an external tank until cavitation was observed in the lines. The amount of fuel in the external tank was determined and subtracted from the original measured amount; the difference being the Unusable Fuel.

Different airplanes attitudes were measured and the resulting fuel is shown below. However, the Unusable Fuel as used in this report was selected at the 8° nose-up attitude since it was felt that this is the most critical in flight as it is the approximate angle of the aircraft (relative to gravity) on the final approach with a 3 degree glide slope and $V = 1.2 V_{stall}$.

The center of gravity of the Unusable Fuel was calculated since the amounts were too small to determine c.g. by actual weighing.

Airplane Attitude	Amount of Unusable Fuel (Lbs.)		
	<u>Fwd. Tank</u>	<u>Aft Tank</u>	<u>Total</u>
Level	5	6	11
$+5^{\circ}$ (Nose Up)	4	4	8
$+8^{\circ}$ (Nose Up)	4	22	26
$+15.7^{\circ}$ (Nose Up)	56	67	123
-5.2° (Nose Down)	3	5	8
-10.5° (Nose Down)	5	24.5	29.5
-15° (Nose Down)	7.5	45	52.5

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3.0 Supplementary Data

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WEIGHING PROCEDURE

1. PRE-WEIGHING INVENTORY

- A. Fwd. and Aft Main Fuel tanks will be drained through sumps until only trapped fuel remains. Airplane is in level position for this operation.
- B. Engine oil tanks are serviced to the prescribed four quart level per tank.
- C. Hydraulic reservoirs should be serviced to the operational level.
- D. A wet battery installed.
- E. All access panels, canopies, etc. will be in place with full complement of fasteners.
- F. A visual count of all flight test equipment will be made to determine exact weight of configuration being used.
- G. A similar check will be made to assure that all basic airplane equipment is aboard.
- H. All control surfaces will be in a faired position and all louvers shut.
- I. A list will be made of ground locks, jack fittings, wheel chocks and any other tare item to be deducted from the scale weight.

2. POSITIONING AIRCRAFT ON SCALES

- A. When the portable platform type scales are used, it is recommended that the aircraft be towed until main gear wheels are each positioned on scales. Then jack airplane at the wing and tail positions until a scale can be rolled in from the side under the nose wheel. This is required because of limited clearance between the bottom of nose fuselage and high point of scale.
- B. The left or right hand main landing gear door sill - 143F060 at fuselage station 287 to 365, waterline 93.25 and buttock line 24 - may be used as reference plane to level aircraft.

3. REFERENCE MEASUREMENTS

After measuring oleo extensions, the corresponding fuselage stations for the centerline points of the nose and main gear axles may be obtained from the tables on the next page. For an actual verification of this wheel base dimension the following procedure should be employed. Connect the main gear jacking lugs with a taut wire and measure the distance from the nose axle centerline along a line perpendicular to the wire. Because the lugs are offset from the main gear axle centerlines, an increment of .17 inches must be added in the CTOL position and .30 inches subtracted in the VTOL position.

Should electronic weighing cells be used, the wing jacking points are at fuselage station 226.5 and the tail jack is at 384.3.

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NOSE GEAR EXTENSION
VS.
FUS. STA. AT E OF AXLE

INCH	FUS. STA.
COMPR.	136.11
1	136.02
2	135.93
3	135.85
4	135.76
5	135.67
5.3	135.61
6	135.59
7	135.50
8	135.41

C.T.O.L. MAIN L.G. EXT.
VS.
FUS. STA. AT E OF AXLE

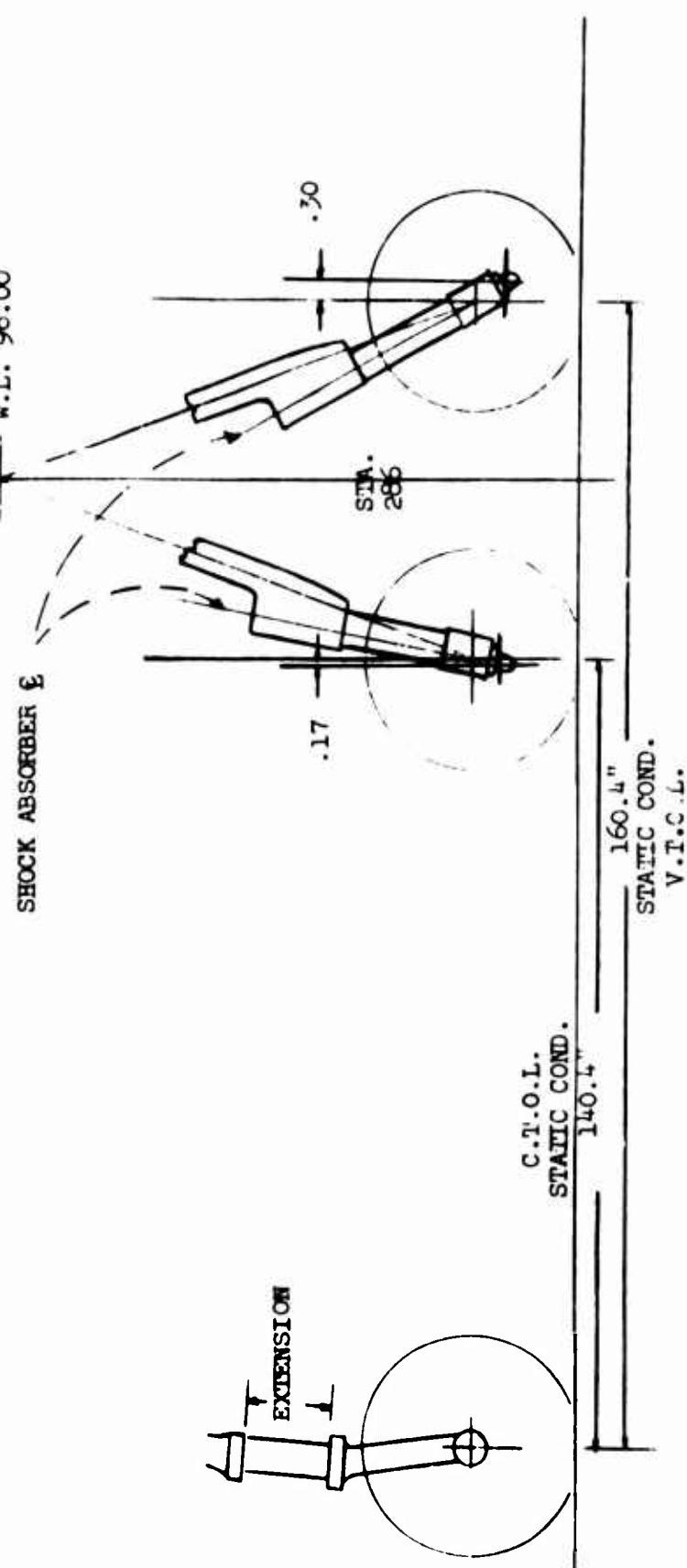
INCH	FUS. STA.
COMPR.	276.38
1	276.26
2	276.14
3	276.02
4	275.90
5	275.78
6	275.66
7	275.53
8	275.41
EXTEN.	275.29

V.T.O.L. MAIN L.G. EXT.
VS.
FUS. STA. AT E OF AXLE

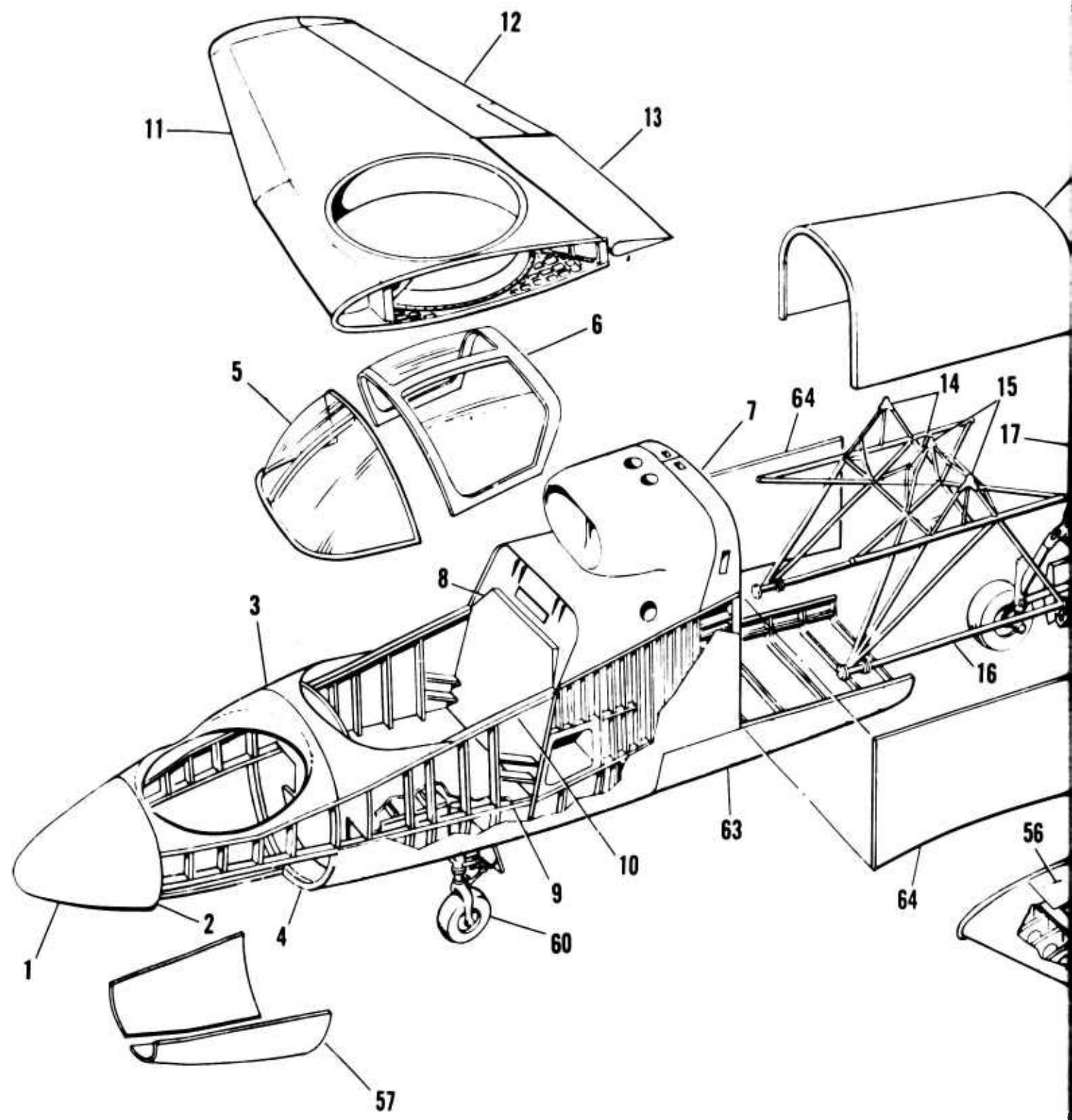
INCH	FUS. STA.
COMPR.	295.32
1	295.57
2	295.81
STATIC	296.05
3	296.05
4	296.29
5	296.53
6	296.78
7	297.02
8	297.26
EXTEN.	297.51

NOSE GEAR EXTENSION
VS.
FUS. STA. AT E OF AXLE

INCH	FUS. STA.
COMPR.	140.4"
1	140.4
2	140.4
3	140.4
4	140.4
5	140.4
6	140.4
7	140.4
8	140.4
EXTEN.	140.4



1. Nose Cone
2. Forward Bulkhead, Pitch-fan
3. Forward Fuselage Section
4. Aft Bulkhead, Pitch-fan
5. Windshield
6. Canopy
7. Front Spar Bulkhead
8. Canted Bulkhead, Forward Fuselage
9. Lower Longeron, Forward Fuselage, L. H.
10. Upper Longeron, Forward Fuselage, L. H.
11. Wing, R. H.
12. Aileron, R. H.
13. Flap, R. H.
14. Right Hand Engine Master Mounts
15. Left Hand Engine Master Mounts
16. Center Fuselage Space Frame
17. Rear Spar Bulkhead
18. Aft Fuselage Section
19. External Longeron
20. Upper Longeron, Aft Fuselage, L. H.
21. Vertical Stabilizer Leading Edge Fairing
22. Vertical Stabilizer
23. Vertical Stabilizer Rear Spar
24. Vertical Stabilizer Center Spar
25. Tail Cone
26. Vertical Stabilizer Rear Spar Bulkhead
27. Vertical Stabilizer Forward Spar
28. Vertical Stabilizer Rib
29. Vertical Stabilizer Center Spar Bulkhead
30. Vertical Stabilizer Forward Spar Bulkhead
31. Tailpipe Aft Bulkhead
32. Tailpipe Exhaust Fairing
33. Lower Longeron, Aft Fuselage, L. H.
34. Rear Wing Spar Fuselage Attach Structure
35. Rudder
36. Rudder Trim Tab
37. Horizontal Stabilizer
38. Horizontal Stabilizer Forward Spar
39. Horizontal Stabilizer Tip
40. Horizontal Stabilizer Center Spar
41. Horizontal Stabilizer Rear Spar
42. Horizontal Stabilizer Rib
43. Elevators
44. Elevator Rib
45. Flap, L. H.
46. Aileron, L. H.
47. Aileron Aft Spar, L. H.
48. Aileron Rib, L.H.
49. Aileron Front Spar, L. H.
50. Wing Aft Spar, L. H.
51. Cap Rib
52. Wing Tip, L. H.
53. Outboard Wing Panel, L. H.
54. Leading Edge Fairing
55. Wing Front Spar, L.H.
56. Inboard Wing Panel
57. Nose Fan Pitch Control Doors
58. Main Landing Gear
59. Main Landing Gear Doors
60. Nose Landing Gear
61. Aileron Trim Tab
62. Center Fuselage Upper Access Cover
63. Center Fuselage Lower Access Cover
64. Center Fuselage Side Access Cover



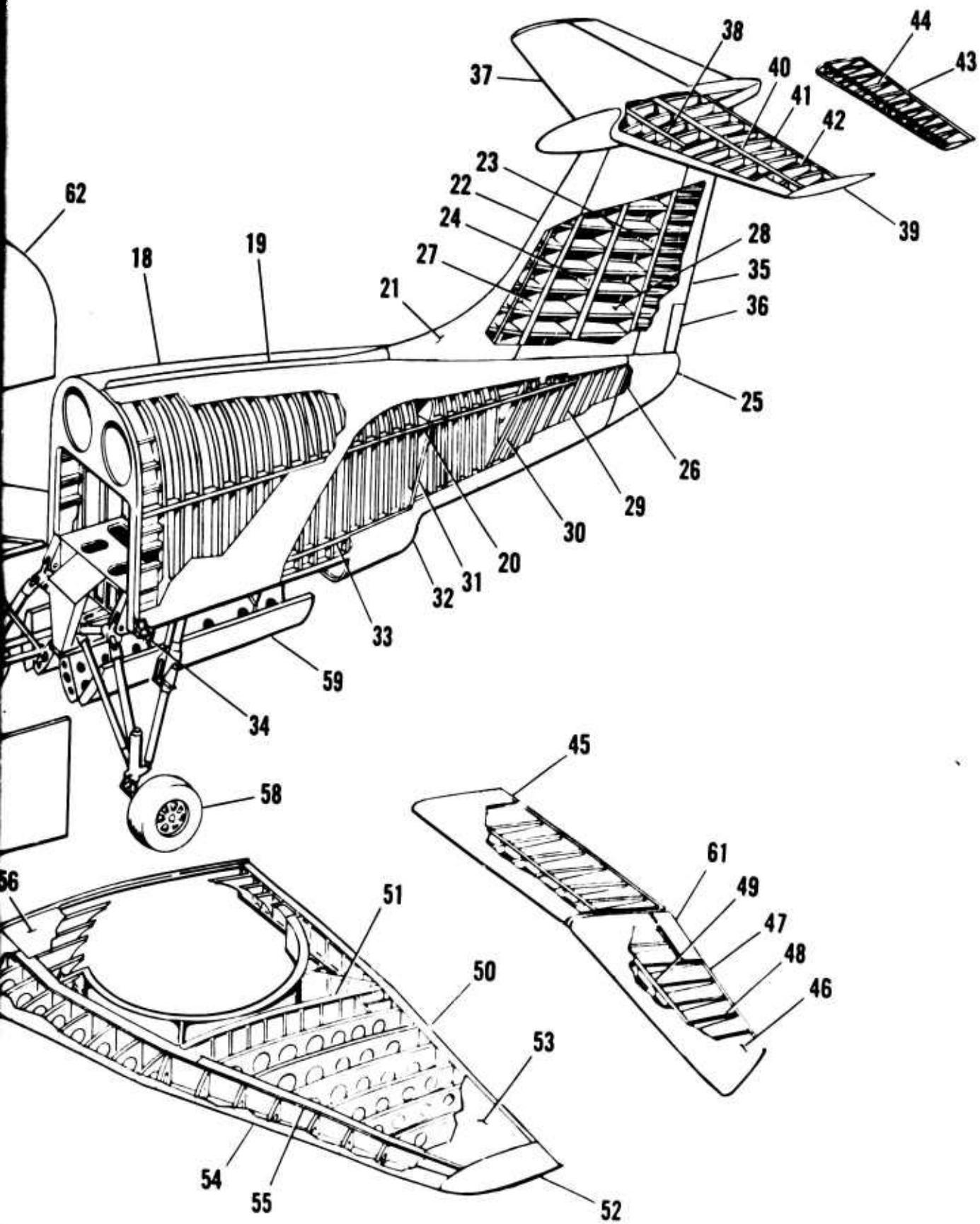
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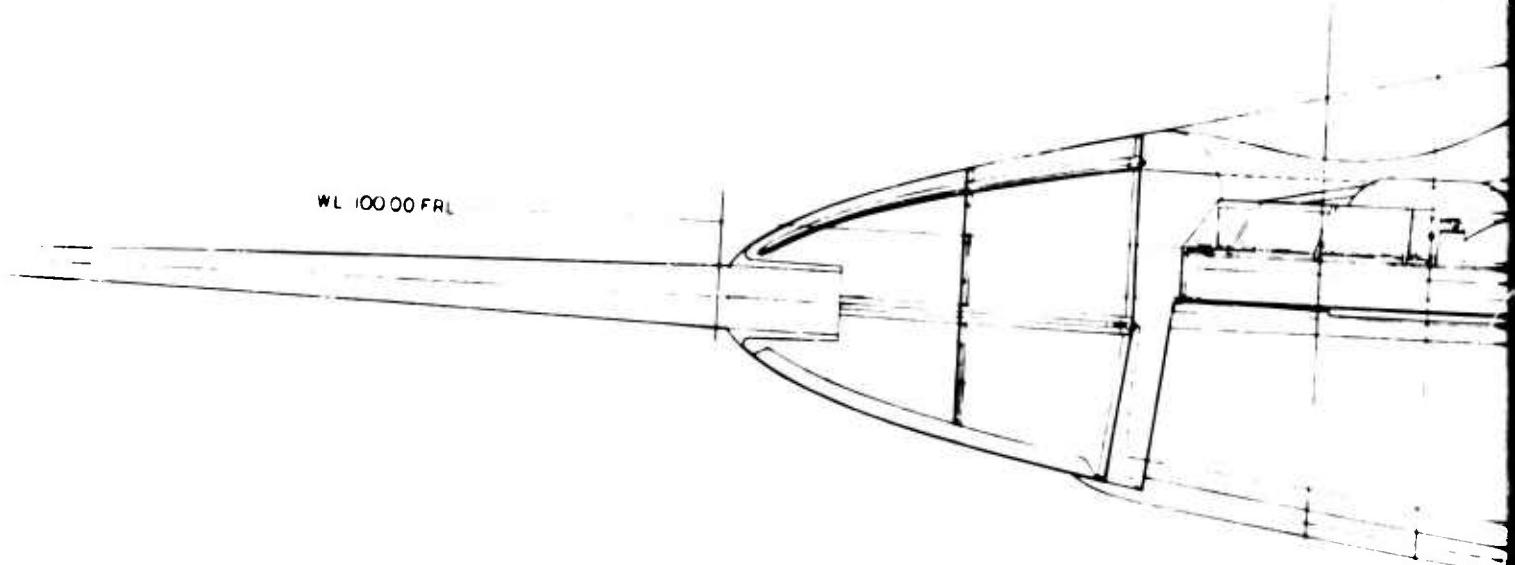
AIRCRAFT BASIC STRUCTURAL ARRANGEMENT

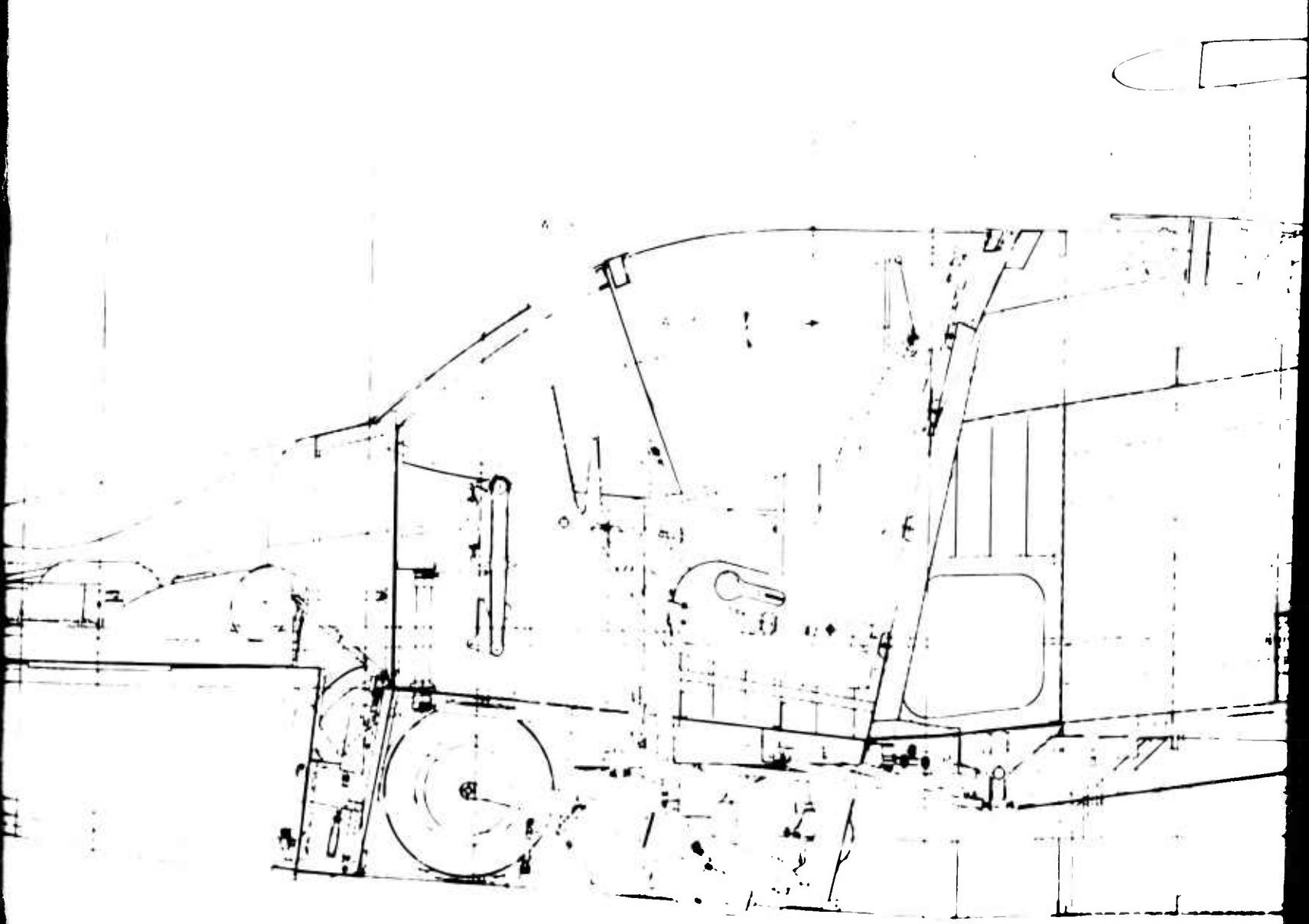


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WL 100.00 FRL



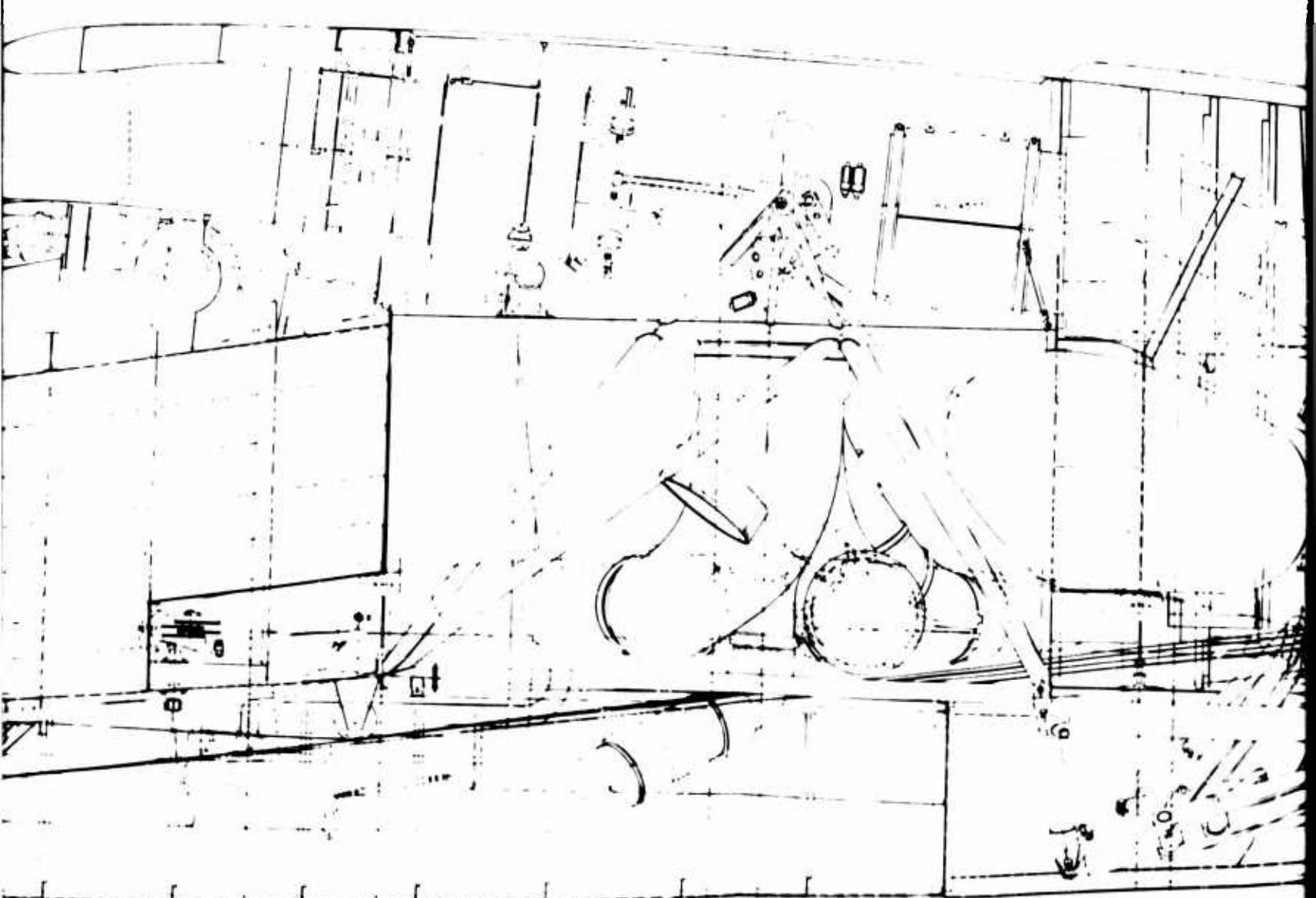


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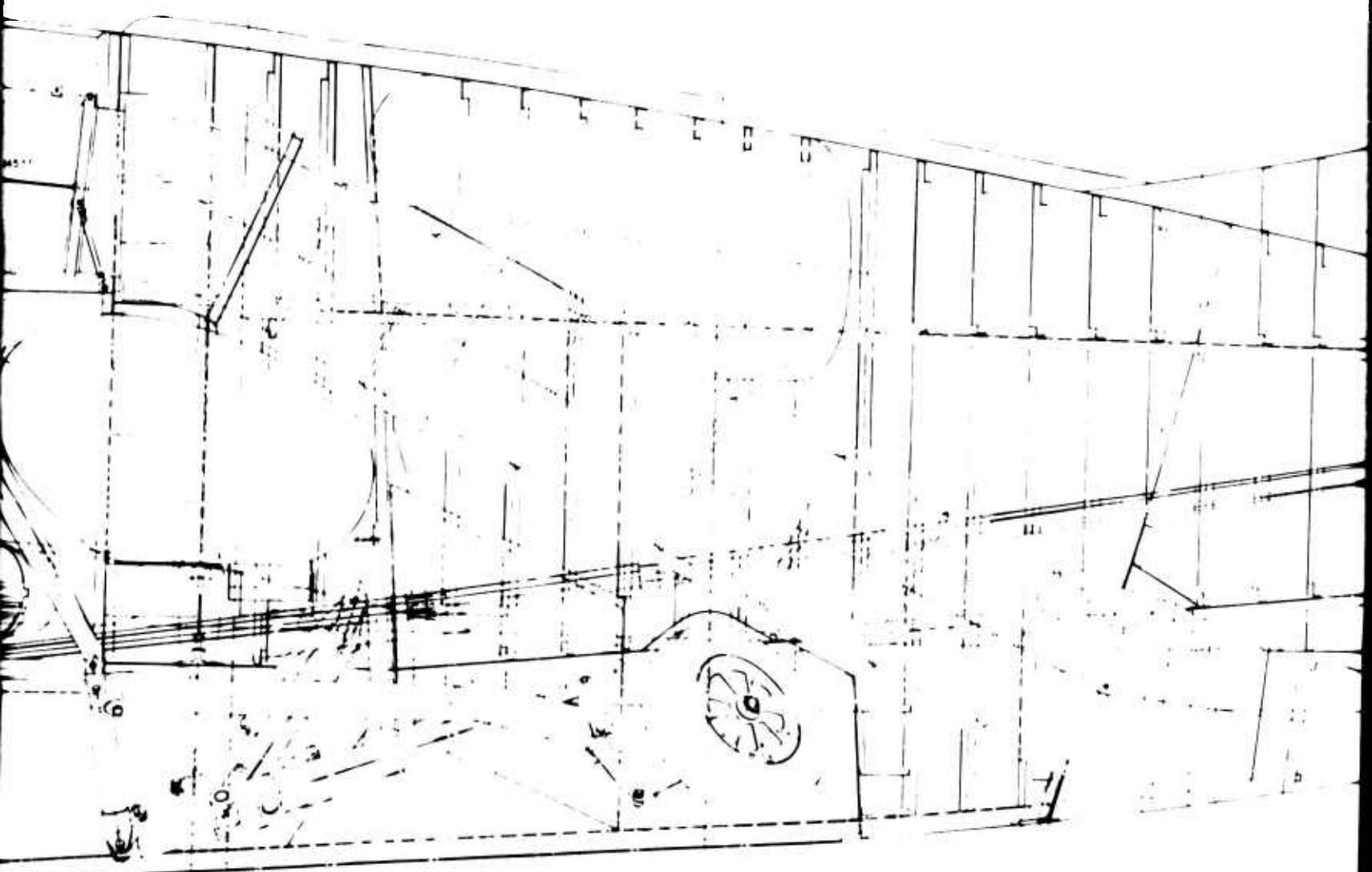
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(107)
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FUS
STA



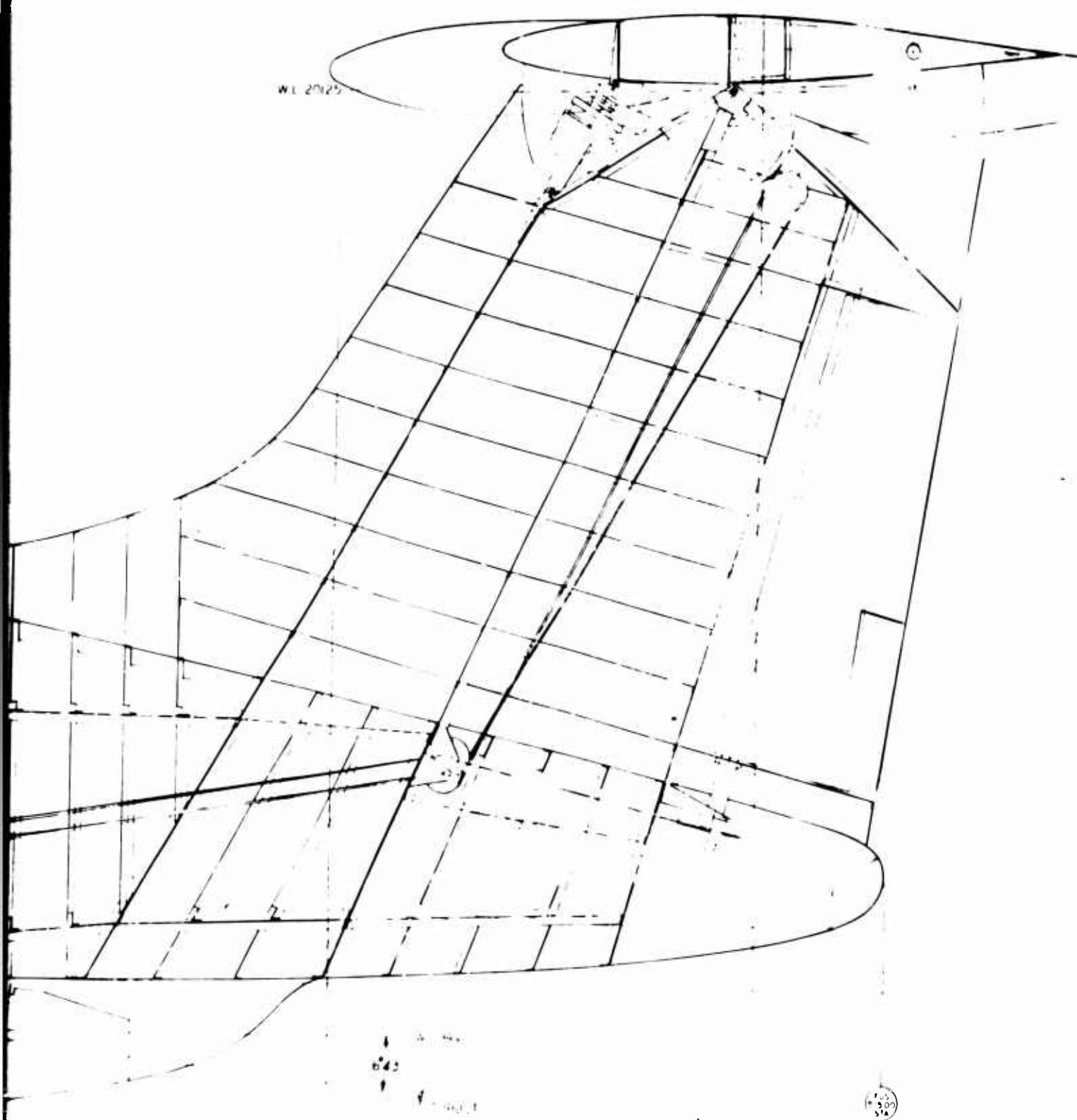
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AIRCRAFT INBOARD PROFILE



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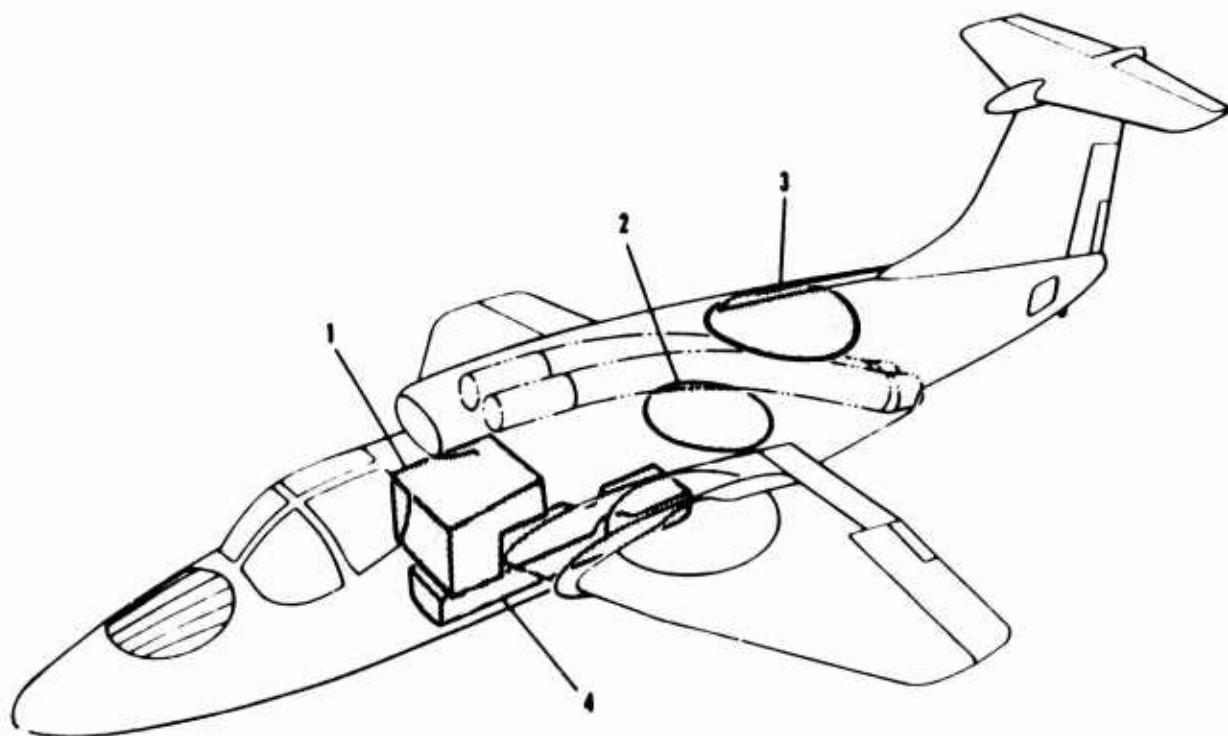
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FUEL SYSTEM TANK LOCATION DIAGRAM



1. Forward Main Fuel Tank
2. Aft Main Fuel Tank
3. Extended Range Dorsal Tank
4. Extended Range Belly Tank

Figure 9

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4.0 MOMENT OF INERTIA

4.1 Gross Weight Moment of Inertia Summary

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SUMMARY OF MOMENT OF INERTIA VALUES

* CONFIGURATION							
	WEIGHT EMPTY (NO INSTRUMENTATION)	20 MINUTE MISSION	45 MINUTE MISSION	DESIGN GROSS WEIGHT 9200 LBS.	DESIGN GROSS WEIGHT 9200 LBS. (LESS INSTRUMENTATION)	ZERO FUEL INCLUDING AUXILIARY FUEL TANK	FULL FUEL INCLUDING AUXILIARY FUEL TANK
1. WEIGHT (POUNDS)	8081	9972	10873	9200	9200	8883	1095
2. HORIZONTAL C.G. (FUS.STA.)	248.4	240.7	241.6	240.8	245.0	241.5	244.2
3. VERTICAL C.G. (WATERLINE)	113	111	112	111	111	111	113
4. FUEL (POUNDS)	0	1154	2035	362	877	0	3210
5. I_{Y_0} (PITCH) SLUG-FT ²	15430	18441	19288	17704	16732	17539	21172
6. I_{X_0} (ROLL) SLUG-FT ²	4412	4608	4552	4530	4447	4520	4678
7. I_{Z_0} (YAW) SLUG-FT ²	17622	20576	21487	19968	18914	19750	23284
8. I_{XZ} (PRODUCT) SLUG-FT ²	1116	1452	1470	1.97	1213	1.79	1817
9. PRINCIPAL AXIS ANGLE THRU C.G.	$5^{\circ}48'$	$5^{\circ}05'$	$4^{\circ}55'$	$4^{\circ}46'$	$4^{\circ}46'$	$5^{\circ}32'$	

* NOTE: All conditions include 515 lbs. of standard instrumentation equipment unless otherwise noted.

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... Fuselage Moment of Inertia

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MASS DISTRIBUTION - FUSELAGE AND CONTENTS - WEIGHT EMPTY

SECTION NUMBER	FUS. STA. BOUNDARIES	WEIGHT	\bar{X}	\bar{Z}	I_y PITCH LB. IN ²	I_x ROLL LB. IN ²	I_z YAW LB. IN ²	I_{xz} PRODUCT LB. IN ²
1	-10 to 0	.42	-2.2	94.0				
5	0 10	2.34	4.8	93.9				
15	10 20	7.95	16.5	94.0				
25	20 30	2.14	25.2	94.0				
35	30 40	25.17	36.1	91.7				
45	40 50	23.75	44.7	91.1				
55	50 60	40.03	56.0	96.4				
65	60 70	146.00	62.0	98.8				
75	70 80	41.35	74.3	91.0				
85	80 90	50.36	85.7	90.7				
95	90 100	83.85	95.8	98.4				
1	100 110	93.65	105.9	109.4				
11	110 120	102.24	114.6	102.3				
12	120 130	109.52	125.2	95.8				
135	130 140	87.35	134.6	98.8				
145	140 150	237.46	146.9	109.4				
155	150 160	185.62	155.6	104.7				
165	160 170	90.97	165.0	112.0				
175	170 180	109.63	174.2	121.3				
185	180 190	145.36	185.2	127.2				
195	190 200	107.15	194.2	122.4				
205	200 210	77.48	205.0	116.2				
* 215	210 220	875.42	215.4	140.2				
225	220 230	82.44	224.7	109.7				
235	230 240	62.65	234.2	114.8				
245	240 250	85.77	243.9	118.0				
** 255	250 260	387.45	256.1	133.9				
265	260 270	63.32	264.1	115.6				
275	270 280	88.46	275.8	119.8				
285	280 290	169.98	285.5	112.5				
295	290 300	114.20	295.3	107.3				
305	300 310	141.71	304.6	100.4				
315	310 320	145.73	314.7	101.9				
325	320 330	98.54	324.8	101.4				
335	330 340	86.06	334.7	100.7				
345	340 350	61.67	343.9	103.9				
355	350 360	127.02	353.2	97.1				
365	360 370	53.77	365.2	106.0				
375	370 380	56.20	374.5	103.4				
385	380 390	27.41	384.7	105.4				
395	390 400	49.08	394.2	104.9				
405	400 410	51.50	404.2	105.5				
415	410 420	28.49	415.2	105.9				
425	420 430	22.18	424.5	108.3				
435	430 440	20.85	434.7	114.6				
445	440 450	14.16	444.4	109.7				

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MASS DISTRIBUTION - FUSELAGE AND CONTENTS -
WEIGHT EMPTY (Continued)

SECTION NUMBER	FUS. STA. BOUNDARIES	WEIGHT	\bar{X}	\bar{Z}	I_y PITCH LB. IN ²	I_x ROLL LB. IN ²	I_z YAW LB. IN ²	I_{xz} PRODUCT LB. IN ²
455	450 to 460	45.29	455.0	112.1				
465	460 470	10.95	465.3	114.3				
475	470 480	34.19	472.7	110.4				
485	480 490	15.38	485.7	110.3				
495	490 500	7.73	494.8	111.0				
505	500 510	9.39	504.6	110.5				
515	510 520	4.76	512.8	113.9				
TOTAL		4745.80	227.8	115.5	46533261	360400	44666372	491043

* INCLUDES FORWARD ENGINE REACTION OF 695.65 at Sta. 215.38

** INCLUDES AFT ENGINE REACTION OF 217.37 Lbs. at Sta. 257.1

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MASS DISTRIBUTION - FUSELAGE BASIC STRUCTURE *

SECTION NUMBER	FUS. STA. BOUNDARIES	WEIGHT	\bar{X}	\bar{Z}	
1	-10 to 0	.42	-2.2	94.0	
5	0 10	2.33	4.8	93.9	
15	10 20	7.95	16.5	94.0	
25	20 30	2.14	29.2	94.0	
35	30 40	10.15	35.5	95.4	
45	40 50	3.97	45.0	97.8	
55	50 60	6.31	56.3	98.5	
65	60 70	7.26	64.8	98.2	
75	70 80	14.99	77.5	90.7	
85	80 90	18.92	84.8	91.4	
95	90 100	16.79	92.6	98.1	
105	100 110	11.76	104.3	92.7	
115	110 120	18.11	113.8	88.6	
125	120 130	13.03	124.6	92.4	
135	130 140	16.63	134.9	90.5	
145	140 150	45.76	146.5	102.3	
155	150 160	34.31	155.6	112.5	
165	160 170	32.64	164.6	105.8	
175	170 180	25.06	175.3	102.1	
185	180 190	28.41	186.6	103.0	
195	190 200	24.95	194.5	103.2	
205	200 210	32.69	205.1	112.2	
215	210 220	100.59	214.4	111.7	
225	220 230	35.65	224.8	109.3	
235	230 240	32.49	235.2	111.5	
245	240 250	34.12	244.5	121.7	
255	250 260	38.79	255.3	124.6	
265	260 270	42.69	264.0	113.9	
275	270 280	35.99	275.8	109.8	
285	280 290	80.79	285.9	116.8	
295	290 300	61.87	295.4	107.1	
305	300 310	29.46	305.2	112.5	
315	310 320	59.38	315.9	106.4	
325	320 330	29.23	325.1	109.2	
335	330 340	24.78	334.5	106.8	
345	340 350	20.58	343.6	116.1	
355	350 360	15.33	354.7	115.0	
365	360 370	16.99	365.5	110.4	
375	370 380	14.45	374.5	112.8	
385	380 390	15.27	385.4	111.2	
395	390 400	25.19	394.4	114.1	
405	400 410	11.18	404.7	121.9	
415	410 420	15.12	415.2	114.7	
425	420 430	13.54	424.5	115.2	
435	430 440	15.31	435.0	118.2	
445	440 450	11.67	444.7	111.3	

* Does not include canopy, windshield, main landing gear door or nose landing gear door.

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MASS DISTRIBUTION - FUSELAGE BASIC STRUCTURE (Continued)

SECTION NUMBER	FUS. STA. BOUNDARIES	WEIGHT	\bar{X}	\bar{Z}	I_y PITCH LB. IN ²	I_x ROLL LB. IN ²	I_z YAW LB. IN ²	I_{xz} PRODUCT LB. IN ²
455	450 to 460	17.54	455.5	114.1				
465	460 470	8.33	465.4	112.4				
475	470 480	12.26	473.9	108.7				
485	480 490	15.15	485.7	110.5				
495	490 500	7.62	494.8	110.9				
505	500 510	9.33	504.6	110.2				
515	510 520	3.63	513.8	113.9				
TOTAL		1228.76	259.5	109.1	14719713	830231	16926.46	626317

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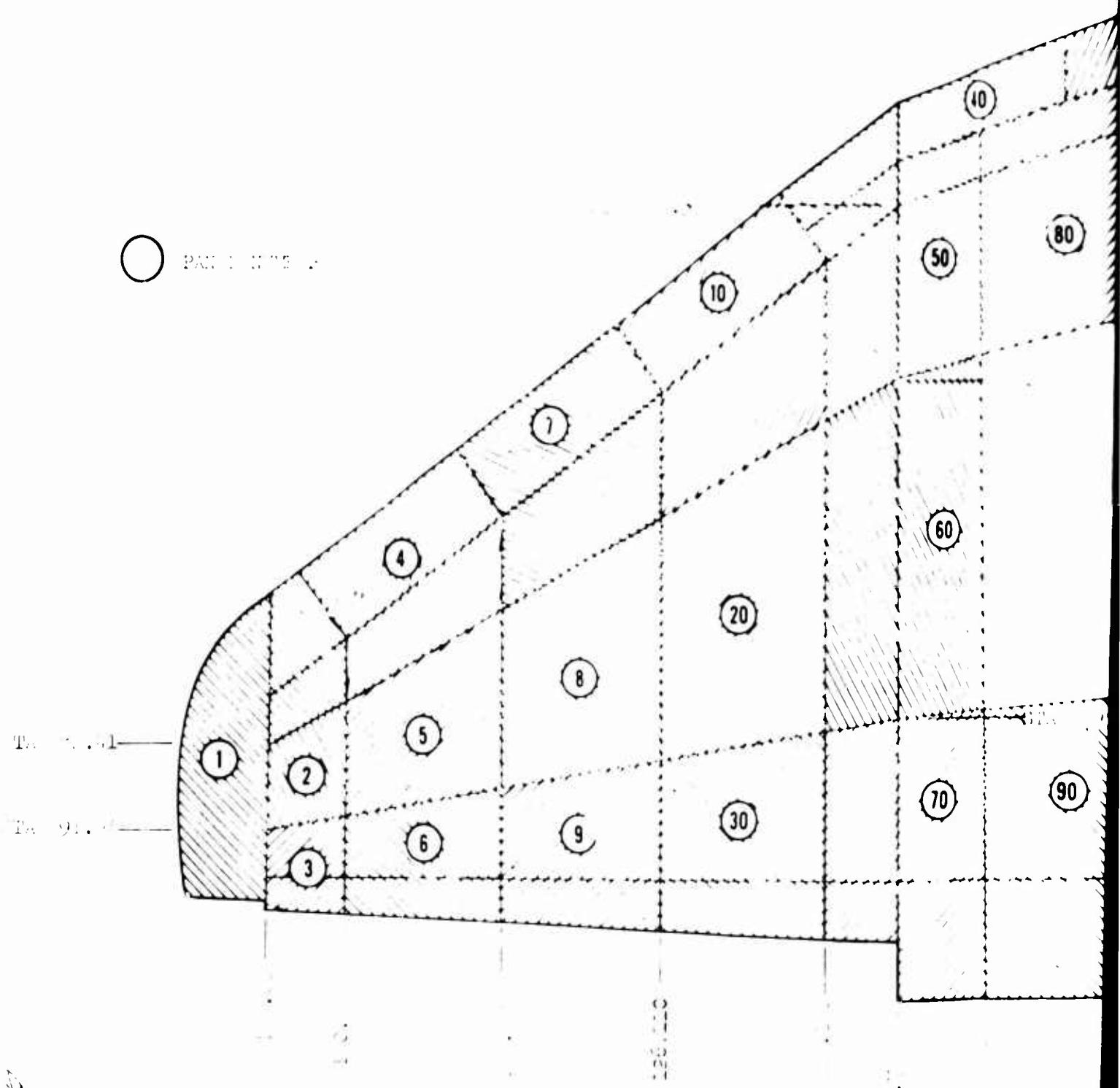
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4.5 Wing Moment of Inertia

PLATE 10.

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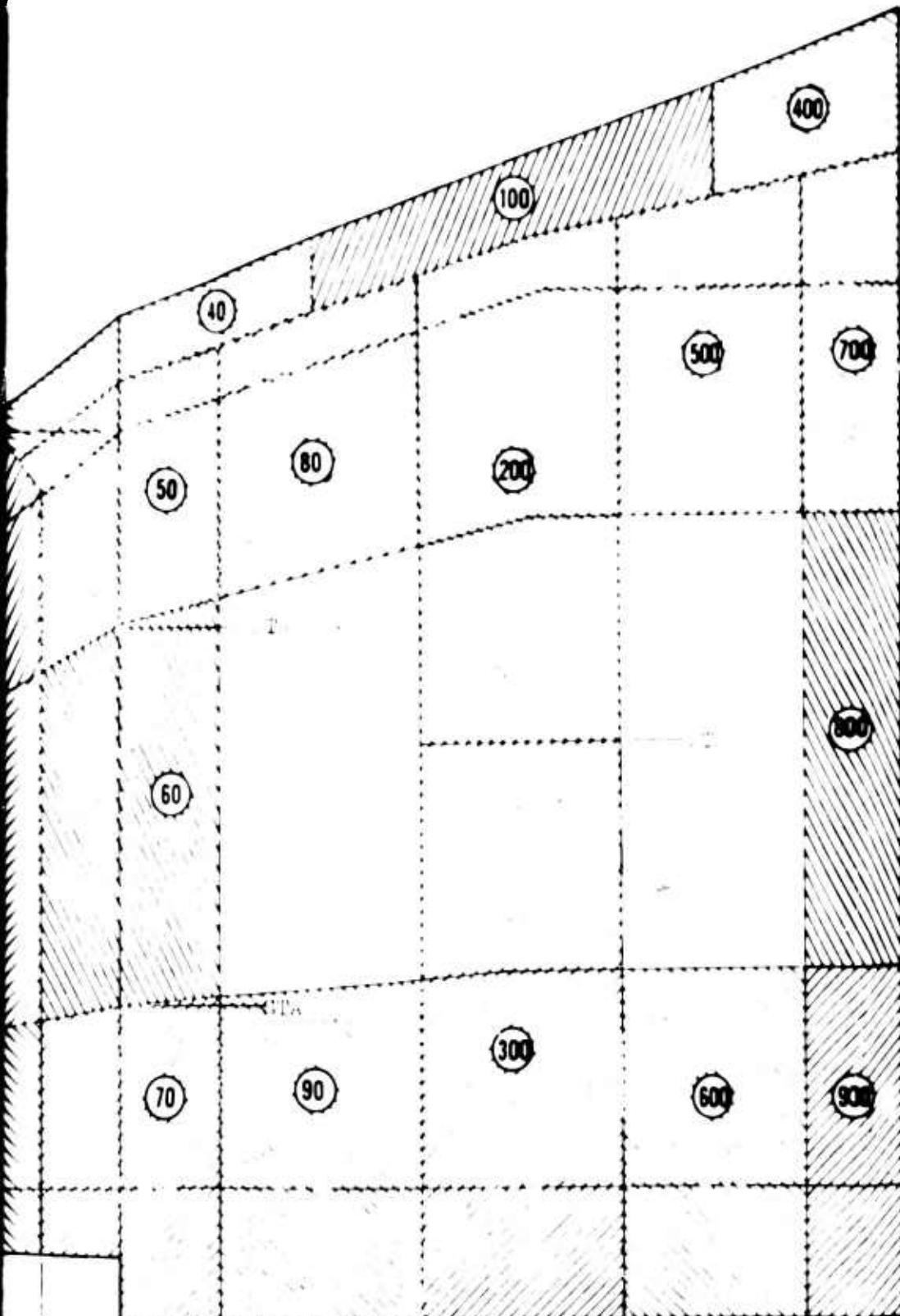


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1611 W. 31ST ST., CHICAGO
ILLINOIS

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WING AND CONTENTS - EXCLUDING FLAP AND AILERON
DATA SHOWN FOR 1/2 WINGLIFT FAN AND MOVEABLE PORTION OF
FAN DOORS ARE TREATED AS SEPARATE UNITS

WEIGHT PANEL NUMBER *	WEIGHT POUNDS	\bar{X} HORIZ. C.G. FUS. STA.	\bar{Z} VERT. C.G. WATERLINE	\bar{Y} SPAN C. G. BUTTOCK LINE	I_y PITCH LB. IN ²	I_x ROLL LB. IN ²	I_z YAW LB. IN ²
1	7.58	274.4	104.3	168.7			
2	1.61	285.7	105.2	165.5			
3	1.76	295.7	105.4	165.2			
4	4.15	264.6	104.0	152.7			
5	2.68	282.0	104.5	152.0			
6	3.32	296.3	105.0	151.6			
7	6.29	252.8	103.3	135.8			
8	5.13	274.1	103.7	136.0			
9	6.62	293.8	102.8	133.7			
10	12.18	239.8	101.9	117.2			
20	10.58	268.4	101.5	119.4			
30	19.32	295.1	101.8	120.7			
40	4.80	219.4	101.5	98.3			
50	24.37	230.5	100.9	100.6			
60	17.94	262.3	101.4	101.3			
70	24.84	294.0	100.1	101.6			
80	17.56	221.4	100.5	80.7			
90	18.72	294.9	100.8	81.4			
100	16.17	206.2	100.5	60.7			
200	71.43	226.2	103.3	59.4			
300	67.58	288.0	102.7	60.6			
400	9.21	195.1	100.5	30.8			
500	23.53	215.4	100.8	41.8			
600	23.43	296.9	100.5	41.0			
700	19.98	216.6	100.5	27.8			
800	4.68	255.7	102.8	26.0			
900	26.16	295.0	100.1	28.2			
DOORS	88.01	255.8	110.4	61.0			
SUB TOTAL	539.63	257.4	103.2	73.0	617105.5	639749.4	1220766.0
FAN	864.85	256.0	101.0	56.0	434970.0	496767.0	668922.0
TOTAL	1404.48	256.5	101.8	62.5	1056205.4	1232239.7	1987333.9

* See Fig. 10

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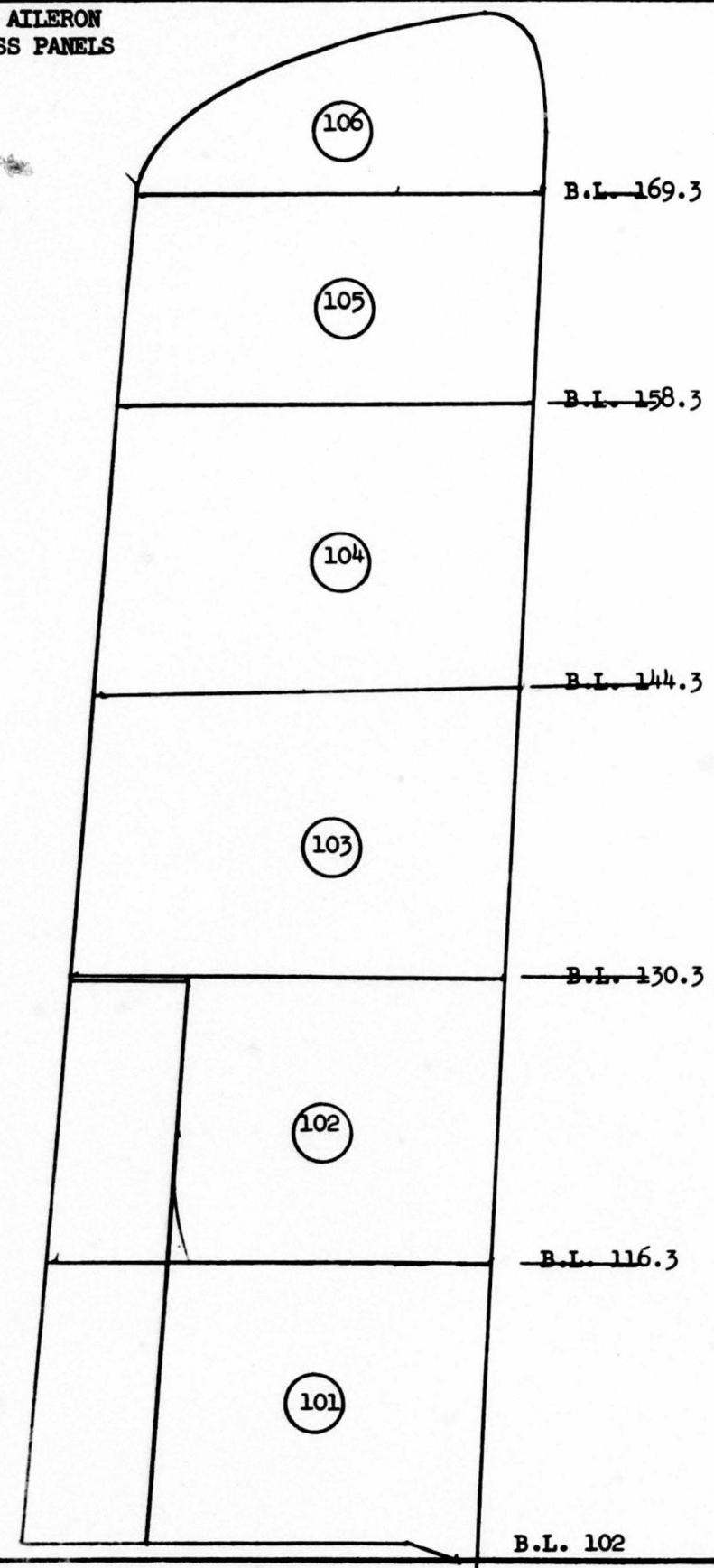
AILERON
MASS PANELS

Fig. 11

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AILERON AND FLIGHT TAB MASS PROPERTIES AND MOMENTS OF INERTIA
DATA FOR ONE SIDE ONLY

PANEL BOUNDARIES ARE BUTTROCK LINES PARALLEL TO CENTER LINE OF AIRPLANE

PANEL NO.	PANEL BOUNDARIES *	WEIGHT POUNDS	PANEL C.G. FJS. STA.	\bar{X}	\bar{Z}	SPAN C.G. BUTT. LINE	\bar{Y}	I_x	I_y	I_z	I_{xz}	I_{xy}	I_{yz}	PRODUCT LB. IN ²
AILERON WITH FLIGHT TAB AND BALANCE WEIGHTS														
101	102-116.3	5.850	312.27	101.52	108.24	302.7	74.0	355.4	-	13.8	11.1	11.4		
102	116.3-130.3	11.995	311.14	102.59	124.39	512.6	84.5	558.3	-	30.5	-	17.8	23.6	
103	130.3-144.3	2.590	306.44	103.62	136.89	111.9	52.6	141.3	-	0.5	-	0.2	15.4	
104	144.3-158.3	2.085	306.25	104.60	151.59	90.0	34.9	105.2	0.4	0.4	-	0.5	14.3	
105	158.3-169.3	2.525	305.81	105.17	165.84	73.0	37.6	91.2	-	1.6	-	1.1	15.3	
106	169.3-Tip	.995	306.74	105.82	172.79	29.4	6.7	31.2	-	0.4	-	0.9	1.1	
TOTAL		26.040	309.85	102.99	130.05	1323.0	9637.3	10750.9	-	122.1	-	1124.5	129.9	
AILERON LESS FLIGHT TAB AND BALANCE WEIGHTS														
101	102-116.3	3.470	307.67	101.83	107.67	115.0	57.8	153.4	-	2.2	-	6.3	10.3	
102	116.3-130.3	7.820	307.34	102.88	124.71	179.3	54.4	199.1	-	5.4	-	6.3	20.9	
103	130.3-144.3	2.590	306.44	103.62	136.89	111.9	52.7	141.3	-	0.5	-	0.2	15.4	
104	144.3-158.3	2.085	306.25	104.60	151.59	90.0	34.9	105.2	0.4	0.4	-	0.5	14.3	
105	158.3-169.3	2.525	305.81	105.17	165.84	73.0	37.6	91.2	-	1.6	-	1.1	15.3	
106	169.3-Tip	.995	306.74	105.82	172.79	29.4	6.7	31.2	-	0.4	-	0.9	1.1	
TOTAL		19.485	306.93	103.42	133.96	634.1	8074.2	8532.0	-	22.8	-	224.8	111.8	
AILERON FLIGHT TAB WITH BALANCE WEIGHTS														
101	102-116.3	2.380	318.98	101.08	109.07	6.4	12.7	18.7	0.3	-	4.8	.2		
102	116.3-Tip	4.175	318.28	102.04	123.80	5.6	25.8	31.0	0.1	-	3.1	.3		
TOTAL		6.555	318.53	101.69	118.45	14.1	368.9	379.5	-	0.6	-	17.5	2.1	
FLIGHT TAB BALANCE WEIGHTS														
101	102-116.3	1.39	317.8	101.0	110.0									
102	116.3-Tip	1.11	316.7	102.0	121.8									
TOTAL		2.50	317.3	101.5	115.2									

* See FIG. 11

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FLAP
MASS PANELS

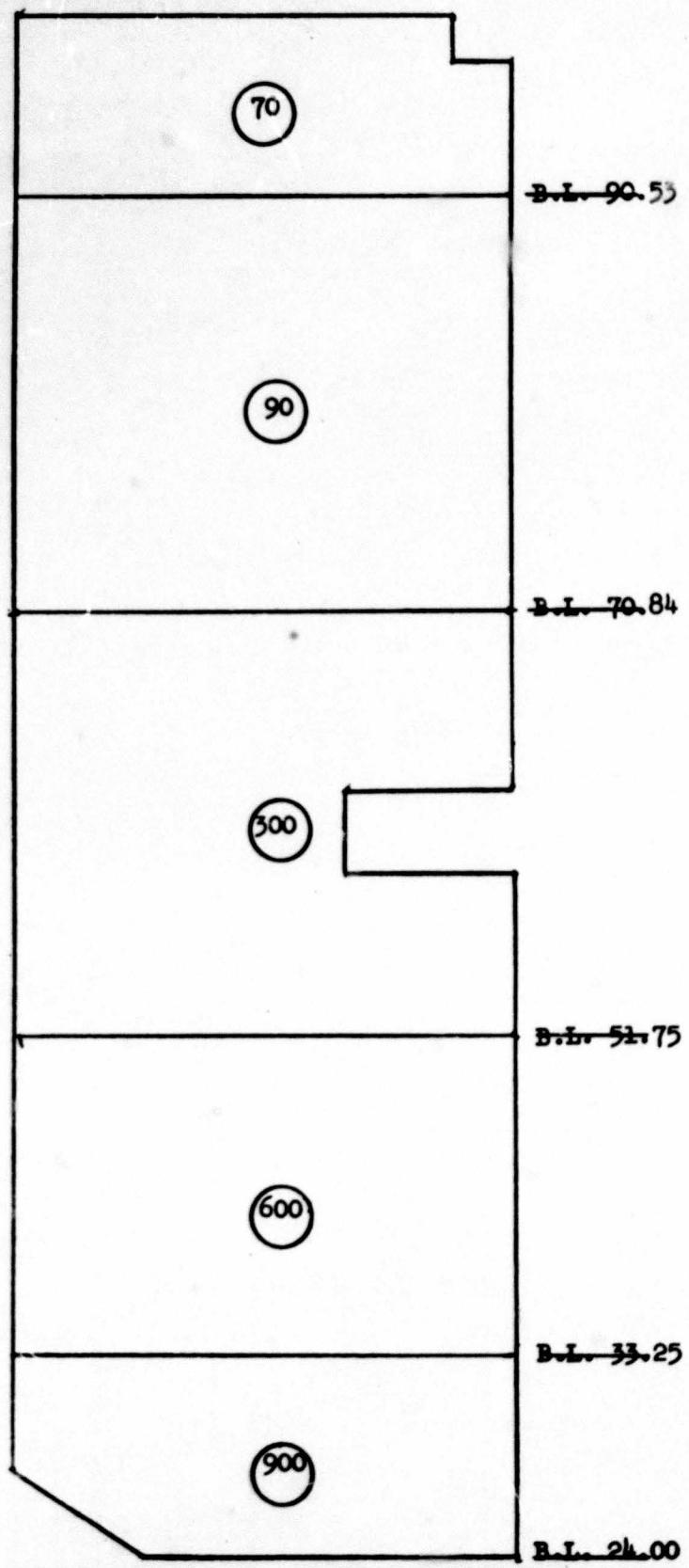


Fig. 12

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MOMENTS OF INERTIA - FLAP
DATA SHOWN FOR ONE SIDE ONLY

WEIGHT PANEL NUMBER	WEIGHT * POUNDS	\bar{X} HORIZ. C.G. FUS STA	\bar{Z} VERT. C.G. WATER LINE	\bar{Y} SPAN C.G. BUTT LINE	I_y PITCH, LB. IN ²	I_x ROLL LB. IN ²	I_z YAW LB. IN ²	I_{xz} PRODUCT LB. IN ²	I_{xy} PRODUCT LB. IN ²	I_{yz} PRODUCT LB. IN ²
70	4.210	312.06	99.58	96.99	55.7	27.4	76.9	4.9	-20.0	3.0
90	6.355	312.69	100.06	81.02	67.2	61.7	120.1	1.4	1.3	3.5
300	7.290	312.81	100.03	60.68	97.9	157.1	241.3	4.4	-22.9	4.2
600	8.675	312.72	100.07	43.19	84.2	68.3	142.6	2.1	-0.6	2.1
900	8.515	310.00	99.90	27.68	97.3	38.1	113.6	9.8	15.0	3.0
TOTAL	35.045	312.00	99.96	56.38	449.2	19812.0	20199.2	25.1	522.4	17.5

* See Fig. 12

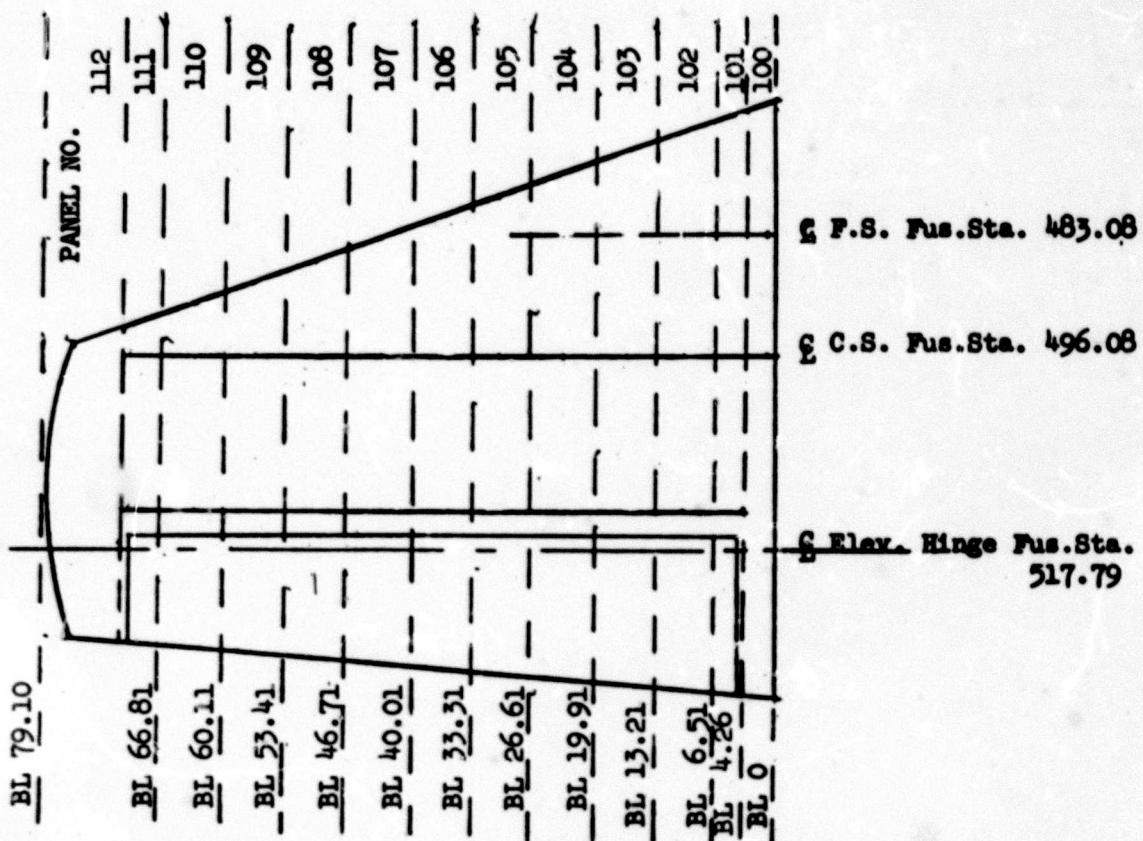
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4.4 Horizontal Tail Moment of Inertia

HORIZONTAL STABILIZER
MASS PANELS

SYMBOL	DEFINITION
X	HORIZONTAL CENTER OF GRAVITY OF ITEM
Y	SPANWISE CENTER OF GRAVITY OF ITEM
Z	VERTICAL CENTER OF GRAVITY OF ITEM
I_x	MOMENT OF INERTIA ABOUT HORIZONTAL AXIS WITH RESPECT TO ITEM CENTER OF GRAVITY
I_y	MOMENT OF INERTIA ABOUT SPANWISE AXIS WITH RESPECT TO ITEM CENTER OF GRAVITY
I_z	MOMENT OF INERTIA ABOUT VERTICAL AXIS WITH RESPECT TO ITEM CENTER OF GRAVITY
I_{xz}	PRODUCT OF INERTIA IN HORIZONTAL-VERTICAL PLANE WITH RESPECT TO ITEM CENTER OF GRAVITY
I_{xy}	PRODUCT OF INERTIA IN HORIZONTAL-SPANWISE PLANE WITH RESPECT TO ITEM CENTER OF GRAVITY
I_{yz}	PRODUCT OF INERTIA IN SPANWISE-VERTICAL PLANE WITH RESPECT TO ITEM CENTER OF GRAVITY

Fig. 13

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* HORIZONTAL STABILIZER AND ELEVATOR MASS DISTRIBUTION AND MOMENTS OF INERTIA
DATA FOR ONE SIDE ONLY

PANEL BOUNDARIES ARE BUTTOCK LINES PARALLEL TO CENTER LINE OF AIRFRAME

PANEL NO.**	PANEL BOUNDARIES BUTT. LINE	WEIGHT ONE SIDE POUNDS	PANEL C.G. FUS STA LINE	\bar{X}	\bar{Y}	PANEL C.G. BUTT. LINE	\bar{Z}	PITCH LB. IN ²	I_x	I_y	ROLL LB. IN ²	I_z	YAW LB. IN ²	I_{xz}	I_{xy}	I_{yz}	PRODUCT LB. IN ²
	HORIZONTAL STABILIZER (EXCLUDING ELEVATOR)																
100	0-4-26	24.68	487.93	0.71	198.38	17490.8	1018.2	16800.4	2938.1	196.1	2938.1	196.1	196.1	196.1	196.1	3.0	
101	4.26-6.51	1.01	495.25	5.02	205.99	146.4	6.3	140.6	-	0.2	-	0.3	0.1	0.1	0.1	0.1	
102	6.51-13.21	3.66	495.71	10.00	205.85	525.7	23.1	515.4	-	2.2	-	0	0	0	0	0.6	
103	13.21-19.91	3.39	496.57	17.00	206.00	454.3	23.2	443.2	0.5	0	0	0	0	0	0	1.1	
104	19.91-26.61	3.18	497.43	23.00	205.99	408.5	22.2	397.7	0	0	0	0	0	0	0	1.4	
105	26.61-33.31	3.23	498.00	30.05	206.00	359.0	21.0	351.5	-	0.2	1.7	1.7	1.7	1.7	1.7	1.6	
106	33.31-40.01	2.94	503.29	36.94	206.00	294.1	11.3	294.1	-	0.1	0.7	0.7	0.7	0.7	0.7	0.8	
107	40.01-46.71	2.20	502.22	43.00	206.00	184.9	10.7	183.5	0	0	0	0	0	0	0	0.9	
108	46.71-53.41	2.07	503.04	50.00	206.00	157.6	9.8	156.7	0	0	0	0	0	0	0	0.9	
109	53.41-60.11	1.88	503.90	57.00	206.00	128.1	8.9	127.4	0	0	0	0	0	0	0	1.1	
110	60.11-66.81	1.77	504.89	63.03	206.00	106.3	8.0	106.0	0.1	-	0.1	0.1	0.1	0.1	0.1	1.1	
111	66.81-69.91	.83	507.04	68.41	206.00	52.9	2.6	52.0	0	0	0	0	0	0	0	0.6	
112	69.91-79.10	3.14	510.32	72.43	206.00	229.4	20.9	232.5	0	-	-2.5	0	0	0	0	0	
	TOTAL STAB.	53.94	495.00	20.31	202.50	24250.8	32398.5	53159.5	4265.2	289.8	169.7						
	ELEVATOR																
101	4.25-6.51	2.04	518.10	3.63	205.91	24.2	11.1	34.2	0	-	0.2	0	0	0	0	0	
102	6.51-13.21	2.87	517.74	9.67	206.00	60.6	10.2	69.0	0	0	2.7	0	0	0	0	0	
103	13.21-19.91	1.95	517.76	17.00	206.00	50.9	7.2	56.6	0	0	0	0	0	0	0	0	
104	19.91-26.61	1.85	517.69	23.37	206.00	44.4	7.4	50.4	0	-	1.2	0	0	0	0	0	
105	26.61-33.31	1.74	517.79	29.97	206.00	38.6	7.1	44.6	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
106	33.31-40.01	2.11	518.03	56.95	206.12	33.9	7.1	38.9	-	0.3	0.4	0.4	0.4	0.4	0.4	0.2	
107	40.01-46.71	1.63	517.61	43.24	206.00	29.8	5.9	34.6	0	-	1.0	0	0	0	0	0.1	

* Includes structure, controls, electrical wiring, etc.

** See Fig. 13

PANEL BOUNDARIES ARE BUTTOCK LINES PARALLEL TO CENTER LINE OF AIRPLANE

PANEL NO. **	PANEL BOUNDARIES BUTT. LINE	WEIGHT ONE SIDE POUNDS	\bar{x}	\bar{y}	\bar{z}	PANEL C.G. BUTT. WATER STA LINE	PANEL C.G. BUTT. WATER STA LINE	I_x	I_y	I_z	ROLL LB. IN ²	ROLL LB. IN ²	ROLL LB. IN ²	PRODUCT LB. IN ²	PRODUCT LB. IN ²	PRODUCT LB. IN ²	I_{xz}	I_{xy}	I_{yz}
ELEVATOR (Continued)																			
108	46.71-53.41	1.65	517.66	50.00	206.00	26.6	6.0	31.5	0	0	0	0	0	0	0	0	0	0	
109	53.41-60.11	1.44	517.87	56.94	206.00	22.8	5.2	27.0	0	-0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
110	60.11-66.81	1.46	517.80	63.15	206.00	20.1	5.1	24.2	0	-0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
111	66.81-69.91	.98	518.03	67.25	206.00	9.2	1.4	10.1	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
TOTAL		19.69	517.84	32.27	206.00	361.3	8142.5	8490.2	-0.4	-1.5	0.8								
STABILIZER AND ELEVATOR																			
100	0-4.26	24.68	487.93	0.71	198.38	17490.8	1018.2	16800.4	2938.1	196.1	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
101	4.26-6.51	3.04	510.54	4.09	205.93	521.8	18.8	527.3	-	1.4	-21.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
102	6.51-13.21	6.52	505.39	9.85	205.91	1366.3	33.5	1364.5	3.0	-9.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
103	13.21-19.91	5.33	504.31	17.00	206.00	1060.6	30.4	1055.2	0.4	0	0	0	0	0	0	0	0	0	
104	19.91-26.61	5.02	504.88	23.14	206.00	931.9	29.8	927.3	0	7.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	
105	26.61-33.31	4.97	504.93	30.02	206.00	840.4	28.1	838.9	-	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
106	33.31-40.01	5.04	509.44	36.95	206.05	594.4	18.4	599.4	1.8	1.2	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	
107	40.01-46.71	3.82	508.86	43.10	206.00	442.1	16.7	445.6	0	2.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
108	46.71-53.41	3.71	509.52	50.00	206.00	379.9	15.8	383.9	0	0	0	0	0	0	0	0	0	0	
109	53.41-60.11	3.51	509.97	56.98	206.00	309.8	14.1	313.3	0	-0.8	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
110	60.11-66.81	3.23	510.73	63.09	206.00	259.6	13.1	263.4	0	0.6	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
111	66.81-69.91	1.81	512.99	68.55	206.00	116.3	4.0	116.5	0	3.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
112	69.91-79.10	3.14	510.32	72.43	206.00	229.4	20.9	232.5	0	-2.6	0	0	0	0	0	0	0	0	
TOTAL		73.63	501.11	23.51	203.44	62289.8	42781.0	71234.3	5417.1	13227.9	216.5								

* Includes structure, controls, electrical wiring, etc.

** See Fig. 13

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HORIZONTAL STABILIZER AND ELEVATOR MASS DISTRIBUTION

DATA FOR ONE SIDE ONLY

PANEL BOUNDARIES ARE BUTTOCK LINES PARALLEL TO CENTER LINE OF AIRPLANE

PANEL NO.*	PANEL BOUNDARIES BUTTOCK LINE	WEIGHT ONE SIDE POUNDS	\bar{X} FUS. STA.	\bar{Y} BUTT. LINE	\bar{Z} WATER LINE
<u>BALANCE WEIGHTS</u>					
101	4.26-6.51	.61	514.4	6.0	206
102	6.51-13.21	2.00	514.4	9.4	206
103	13.21-19.91	1.74	514.6	17.0	206
104	19.91-26.61	1.65	514.7	23.7	206
105	26.61-33.31	1.50	514.9	29.9	206
106	33.31-40.01	1.10	515.0	36.7	206
107	40.01-46.71	1.26	515.2	43.6	206
108	46.71-53.41	1.35	515.3	50.0	206
109	53.41-60.11	1.02	515.4	57.0	206
110	60.11-66.81	1.09	515.6	63.4	206
111	66.81-69.91	.45	515.7	68.0	206
TOTAL		6.88	514.9	33.2	206

* See Fig. 13

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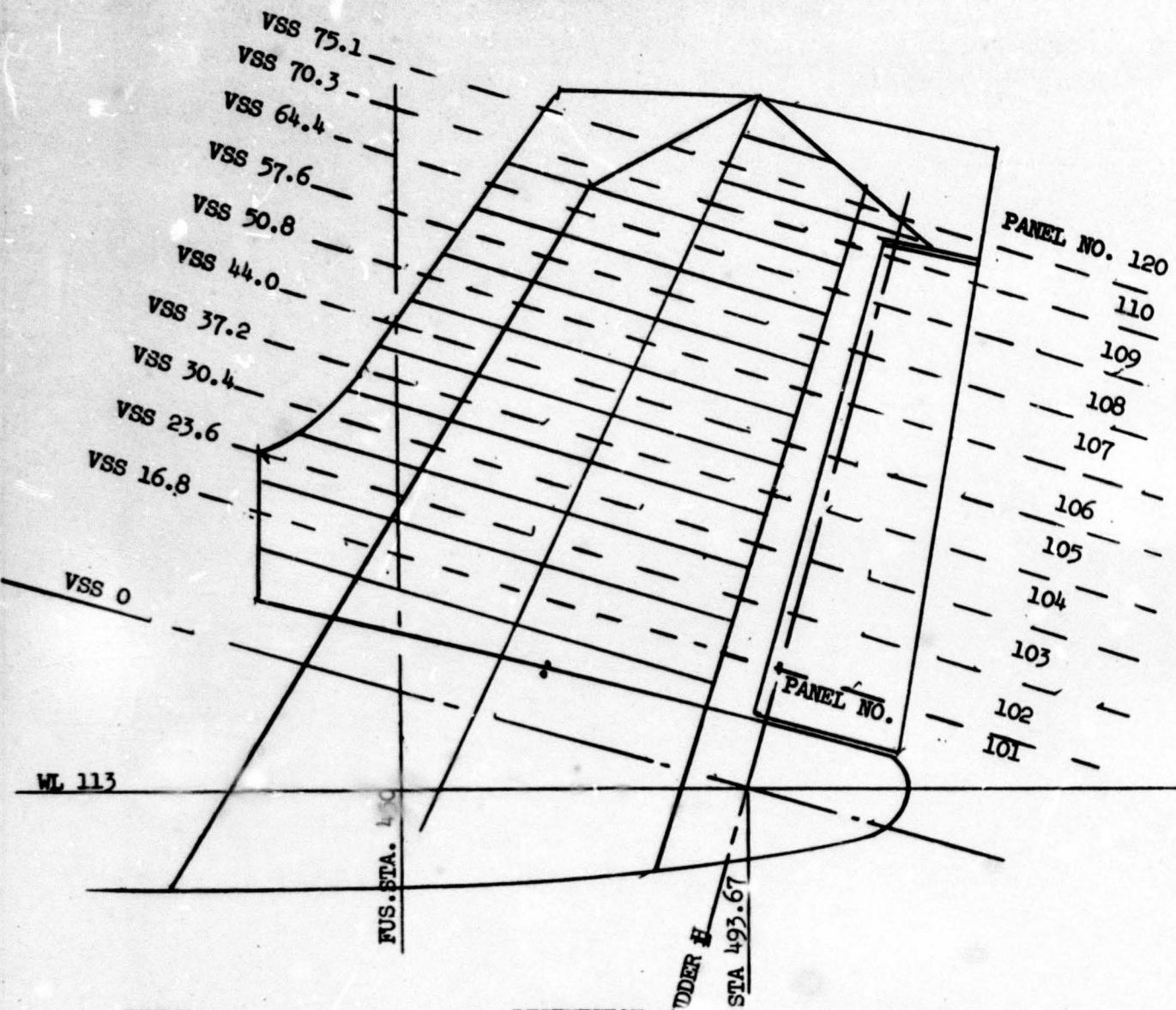
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4.5 Vertical Tail Moment of Inertia

VERTICAL STABILIZER

MASS PANELS

SYMBOLDEFINITION

\bar{X}	Horizontal center of gravity of item	fuselage station).
\bar{Y}	Longitudinal c.g. of item. Assume	be Buttock Line Zero.
\bar{Z}	Vertical Center of gravity of item (Water Line).	
I_x	Moment of inertia about horizontal axis with respect to item c.g..	
I_y	Moment of inertia about spanwise axis with respect to item c.g.	
I_z	Moment of inertia about vertical axis with respect to item c.g.	
I_{xz}	Product of inertia in horizontal-vertical plane with respect to item c.g.	

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VERTICAL STABILIZER AND RUDDER MASS DISTRIBUTION AND MOMENTS OF INERTIA

PANEL BOUNDARIES ARE VERTICAL STABILIZER STATIONS PERPENDICULAR TO RUDDER
HINGE LINE

PANEL NO.*	PANEL BOUNDARIES STAB. STA.	WEIGHT POUNDS	\bar{X} PANEL C.G. FUS. STA.	\bar{Z} PANEL C.G. WATERLINE	I_y PITCH LB. IN ²	I_x ROLL LB. IN ²	I_z YAW LB. IN ²	I_{xz} PRODUCT LB. IN ²
RUDDER INCLUDING BALANCE WEIGHTS								
101	0-16.8	13.67	495.33 *	122.53	694.1	362.2	388.1	- 97.2
102	16.8-23.6	4.48	499.09	132.50	222.0	27.0	207.8	- 39.1
103	23.6-30.4	3.25	500.38	139.43	145.1	25.3	129.8	- 33.6
104	30.4-37.2	3.49	503.57	145.81	200.5	26.1	183.8	- 40.9
105	37.2-44.0	2.99	502.61	152.42	74.4	16.1	67.5	- 10.5
106	44.0-50.8	2.67	504.69	158.98	65.2	11.0	60.7	- 6.1
107	50.8-57.6	1.77	508.04	165.18	48.1	9.3	45.3	- 6.1
108	57.6-64.4	1.71	509.79	172.22	41.8	9.1	38.9	- 5.3
109	64.4-70.3	1.32	511.28	178.11	28.1	6.3	26.7	- 4.6
110	70.3-72.05	.95	513.03	181.61	9.4	1.1	9.7	- 1.2
TOTAL		36.30	500.67	140.64	14954.6	12902.3	2175.3	3271.9

STABILIZER AND RUDDER								
101	0-16.8	25.67	482.11	127.18	10812.3	1580.8	9622.3	-2854.4
102	16.8-23.6	12.07	478.37	138.15	5626.2	545.7	5567.1	-1347.9
103	23.6-30.4	10.75	478.80	145.30	4670.6	445.3	4468.2	-1068.4
104	30.4-37.2	13.36	475.99	152.96	6512.5	555.7	6179.1	-1526.0
105	37.2-44.0	10.68	482.75	158.32	3793.8	394.2	3608.8	- 811.9
106	44.0-50.8	8.81	485.66	164.08	2874.1	277.4	2778.5	- 617.9
107	50.8-57.6	8.45	486.96	171.07	2445.9	236.6	2343.2	- 529.5
108	57.6-64.4	8.23	489.05	177.34	2144.7	200.6	2069.3	- 445.4
109	64.4-70.3	9.78	489.27	184.03	2137.8	184.2	2077.2	- 405.6
110	70.3-75.1	12.54	494.09	187.77	2609.6	224.4	2494.6	- 557.2
120	75.1-TOP	31.33	492.31	196.50	4604.6	448.3	4283.9	- 834.1
TOTAL		151.67	485.50	164.10	148326.0	99666.3	50813.5	8064.3

*See Fig. 14

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VERTICAL STABILIZER AND RUDDER MASS DISTRIBUTION
AND MOMENTS OF INERTIA

PANEL BOUNDARIES ARE VERTICAL STABILIZER STATIONS PERPENDICULAR TO RUDDER HINGE LINE
 VERTICAL STABILIZER (EXCLUDING RUDDER)

PANEL NO. *	PANEL BOUNDARIES STAB. STA.	WEIGHT POUNDS	\bar{X} PANEL C.G. FUS. STA.	\bar{Z} PANEL C.G. WATERLINE	I_y PITCH LB. IN ²	I_x ROLL LB. IN ²	I_z YAW LB. IN ²	I_{xz} PRODUCT LB. IN ²
101	0-16.8	12.00	467.04	132.47	4371.6	587.3	4118.9	- 960.2
102	16.8-23.6	7.59	466.14	141.48	2319.4	291.6	2301.5	- 475.5
103	23.6-30.4	7.50	469.45	147.84	2195.0	259.5	2168.3	- 444.7
104	30.4-37.2	9.87	466.23	155.48	2475.8	288.2	2400.6	- 553.4
105	37.2-44.0	7.69	475.03	160.62	1937.1	233.3	1903.8	- 314.5
106	44.0-50.8	6.14	477.39	166.30	1321.8	166.8	1330.2	- 240.3
107	50.8-57.6	6.68	481.38	172.63	1325.5	149.7	1303.3	- 245.7
108	57.6-64.4	6.52	483.61	178.68	1117.8	134.9	1101.9	- 210.9
109	64.4-70.3	8.46	485.84	184.95	1317.2	124.5	1311.2	- 202.5
110	70.3-75.1	11.59	492.54	188.27	2192.5	184.2	2116.1	- 436.1
120	75.1-TOP	31.30	492.31	196.50	4604.6	448.3	4283.9	- 834.1
TOTAL		115.37	480.72	171.49	96118.3	60499.9	37648.3	21782.0

BALANCE WEIGHTS

PANEL NO.*	PANEL BOUNDARIES STAB. STA.	WEIGHT POUNDS	\bar{X} PANEL C.G. FUS. STA.	\bar{Z} PANEL C.G. WATERLINE
101	0-16.8	1.87	492.0	129.0
102	16.8-23.6	1.88	493.5	133.4
103	23.6-30.4	1.49	495.8	141.0
104	30.4-37.2	1.56	497.9	147.4
105	37.2-44.0	1.66	499.9	153.0
106	44.0-50.8	1.41	501.8	159.2
107	50.8-57.6	.52	503.9	166.0
108	57.6-64.4	.52	506.0	173.0
109	64.4-70.3	.45	508.1	179.0
110	70.3-72.05	.11	509.1	182.0
TOTAL		11.47	497.8	147.3

*See Fig. 14

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4.6 Instrumentation Moment of Inertia

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INSTRUMENTATION MOMENTS OF INERTIA

BREAKDOWN BY AREA	WEIGHT POUNDS	\bar{X} FUS. STA.	\bar{Z} WATER- LINE	\bar{Y} BUTTOCK LINE	I_x ROLL LB. IN ²	I_y PITCH LB. IN ²	I_z YAW LB. IN ²
Wing	28.41	250.3	100.9	70.6	25144.4	14697.6	39752.0
Fuselage	478.28	152.3	103.0	0	151122.3	2172986.6	2186931.0
Horiz. Stab.	5.13	483.6	199.4	12.9	3036.6	874.6	3692.0
Vert. Stab.	3.11	478.9	159.9	0	2027.9	2711.8	686.6
Aileron	.07	317.7	102.0	126.0	0	0	0
Total Instru.	515.0	163.0	104.2	0	382287.3	3359135.0	3485530.0